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THESIS

**PERFORMANCE-BASED SERVICE ACQUISITION (PBSA)
OF TRIDENT STRATEGIC WEAPONS SYSTEMS (SWS)
TECHNICAL ENGINEERING SUPPORT (TES) SERVICES**

by

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September 2003

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STRATEGIC WEAPONS SYSTEMS (SWS)
TECHNICAL ENGINEERING SUPPORT (TES) SERVICES**

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ABSTRACT

The objective of this thesis is to determine whether the Strategic Systems Programs (SSP) should apply the concepts of Performance Based Service Acquisition (PBSA) to Strategic Weapons Systems (SWS) Technical Engineering Support (TES) Services. This thesis provides a Department of Defense (DoD), Department of the Navy (DON), and SSP SWS program acquisition and PBSA history background, reviews overarching PBSA policy and the DON PBSA implementation plan, defines a working PBSA model, defines Major Defense Acquisition Programs (MDAPs), details the SWS program structure, defines target SWS TES services, and reviews and analyzes SWS TES service contracts and associated PBSA implementation attempts. The thesis concludes that the complete conversion of SWS TES services to PBSA is neither practicable nor desirable and recommends that SSP (1) establish a Government-only multi-functional PBSA team to perform a review of existing TES services statements of work to determine potential PBSA conversion tasking, (2) team with its business partners to develop a PBSA conversion business case, and (3) contract for selected SWS PBSA TES services through the use of a CPIF completion contracting approach with an aggressive share line and targeted performance incentives.

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I. INTRODUCTION

A. BACKGROUND

1. General

Federal acquisition generally involves the purchase of construction, research and development, services, and supplies and equipment. After the end of the Cold War and prior to the events of September 11, 2001 Federal acquisition declined significantly. During the 1990s Federal contract spending over the \$25,000 small purchase threshold fell from a high of \$232 billion in Fiscal Year (FY) 1991 to a low of \$188 billion in FY 1999 before increasing to \$204 billion in FY 2000 [Ref. 1: p. 3]. During the same period the predominant type of purchase shifted from supplies and equipment to services. In FY 1991 the percentages of dollars expended for supplies and equipment acquisition and service acquisition to overall acquisition were 44.4 percent and 33.6 percent, respectively. In FY 1999 the percentages of dollars for supplies and equipment acquisition and service acquisition to overall acquisition were 35.1 percent and 42.6 percent, respectively. The Department of Defense (DoD) is the largest purchaser of services. DoD was responsible for over \$53 billion or 60 percent of all Federal services acquisition dollars expended in FY 2000 [Ref. 2: p. 3]. The growth in DoD services acquisition was largely driven by increases in information technology services and professional, administrative, and management support services [Ref. 2: p. 1]. In addition to the growth in service acquisition the General Accounting Office (GAO) has routinely provided testimony before the United States House of Representatives and Senate concluding that the Government is mismanaging service contracts [Refs. 3 and 4].

In light of these circumstances service acquisition policy related to Federal acquisition in general and DoD in particular has been revised to encourage the use of performance-based contracting approaches in the hopes of achieving efficiencies and resulting cost savings. Chapter II will provide comprehensive insight into the implementing Performance Based Service Acquisition (PBSA) policies. A review of the specific policy changes (1) reinforces that the Government considers the acquisition of

commercially available services a key and growing component of its overall mission, (2) demonstrates that the Government has gone through a philosophical shift in service acquisition strategy towards PBSA, and (3) establishes that the Government will aggressively focus on ensuring that the principles of PBSA be implemented to the maximum extent practicable. It should be noted that different policies and guides referenced throughout this thesis use the terms “Performance-Based Service Contracting (PBSC)” and “PBSA”. The Researcher uses the cited terms to maintain the integrity of the each reference. However, the terms are considered interchangeable and the Researcher will use the term “PBSA” for general discussion purposes.

During FY 2002 the Department of the Navy (DON) was responsible for more aggregate contract award dollars than any other individual DoD component as illustrated in Figure 1 below.

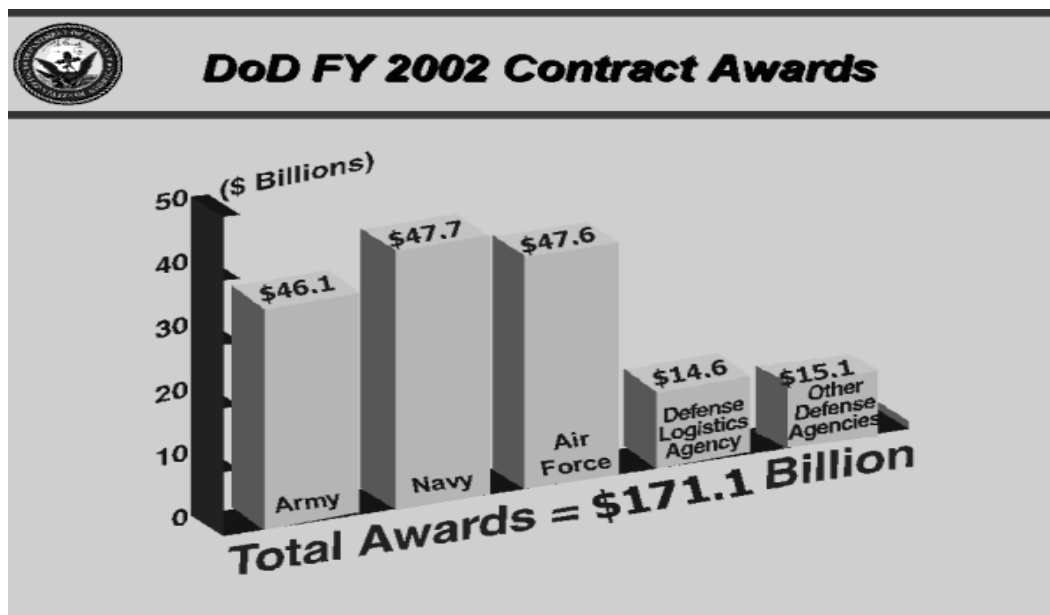


Figure 1
DoD FY 2002 Contract Awards

(Source: From <http://www.abm.rda.hq.navy.mil/presentation.cfm>, 6 May 2003, slide 6)

In FY 2002 DON was responsible for \$47.7B or 27.9 percent of all DoD contract award dollars compared to \$47.6B or 27.8 percent for the Air Force, \$46.1B or 26.9 percent for the Army, \$14.6B or 8.5% for the Defense Logistics Agency, and \$15.1B or

8.8% for all other defense agencies. Figure 2 illustrates DON's acquisition structure that includes a centralized management and policy group that steers Departmental execution philosophy and resulting priorities and multiple buying Commands that possess the delegated authority to manage and execute varying missions.

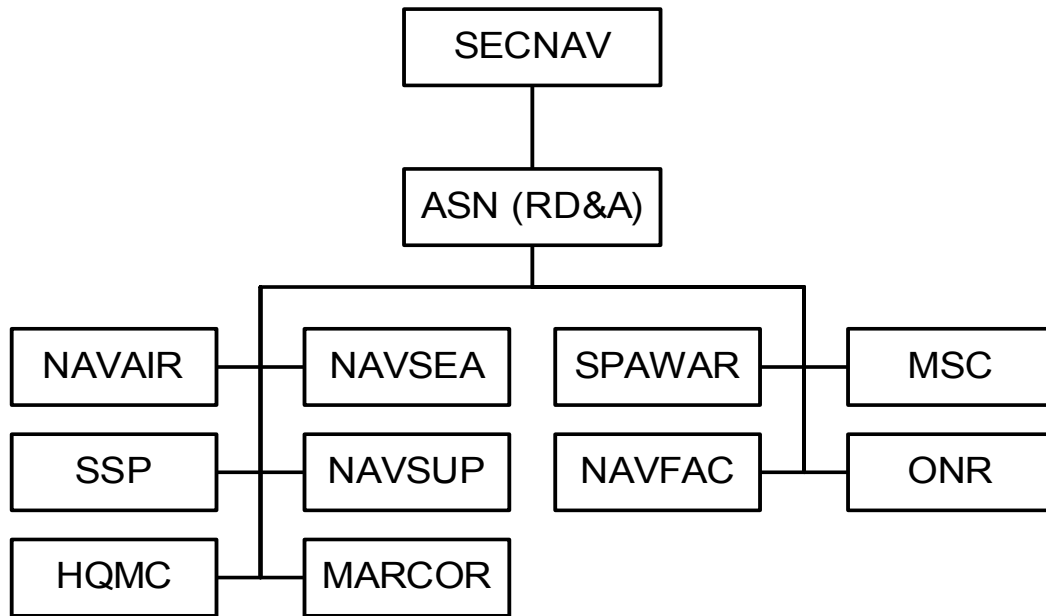


Figure 2
DON Acquisition Structure (Source: Developed by Researcher)

To date DON has achieved some experience and success in implementing PBSA on services including: non-technical “blue collar” support; operation and maintenance of facilities; administrative and clerical support; computer maintenance and test range support; transportation, travel and relocation services; medical services; telephone call center operations; training; software maintenance and support; environmental remediation; software development; management support; studies and analyses; and surveys [Ref. 5: Appendix 4]. Table 1 below provides DON-wide PBSA metric information for FY 2002 including the number of service actions, number of PBSA actions, percentage of PBSA actions to overall service actions, service dollars, PBSA dollars, and percentage of PBSA dollars to total service dollars.

Table 1
FY 2002 DON PBSA Service Metrics

<u>SCSYSNAME</u>	PBSA			PBSA		
	<u>SERVICES</u> <u>ACTIONS</u>	<u>SERVICES</u> <u>ACTIONS</u>	<u>PERCENT</u>	<u>SERVICES</u> <u>DOLLARS</u>	<u>SERVICES</u> <u>DOLLARS</u>	<u>PERCENT</u>
MSC	1,789	213	11.91	\$1,043,602,661	\$501,068,676	48.01
NAVSUP	12,550	4,727	37.67	\$3,341,649,441	\$1,352,355,773	40.47
MARCOR	566	65	11.48	\$92,488,740	\$25,680,839	27.77
HQMC	772	225	29.15	\$421,823,782	\$107,927,258	25.59
SSP	176	55	31.25	\$546,377,002	\$135,144,143	24.73
NAVAIR	5,515	1,128	20.45	\$2,608,189,426	\$551,126,665	21.13
ONR	485	44	9.07	\$83,107,709	\$10,076,080	12.12
NAVSEA	17,239	1,418	8.23	\$4,041,995,681	\$317,082,350	7.84
NAVFAC	60,156	7,344	12.21	\$5,143,772,966	\$395,708,196	7.69
SPAWAR	<u>5,509</u>	<u>287</u>	<u>5.21</u>	<u>\$1,274,052,870</u>	<u>\$77,689,720</u>	<u>6.10</u>
TOTAL	104,757	15,506	14.80	\$18,597,060,278	\$3,473,859,700	18.68

(Source: From ASN Provided Metric Information (DD350 Basis) dated 8 April 2003)

Overall the data indicates that during FY 2002 14.8% of all DON service related actions and 18.68% of all DON service related dollars were acquired through the use of PBSA. In addition there is a wide range of performance among the System Commands with PBSA action data ranging from 5.21% to 37.67% of all service actions and PBSA dollar data ranging from 6.1% to 48.01% of all service dollars. A potentially large target area of opportunity exists if a method of PBSA application can be developed for Technical Engineering Support (TES) services. Chapter III will provide a comprehensive definition of TES services. Generally, TES services are more complex and costlier to contract than those services detailed above. Since TES services are expensive to the Government the successful application of PBSA on TES services could provide

meaningful savings to the Government. Conclusions and recommendations developed within this thesis will discuss the practicality of applying PBSA on TES services and lay the foundation for development of a practical model.

2. Strategic Weapon System (SWS) Program

On 2 December 1955 Admiral Arleigh Burke, the Chief of Naval Operations (CNO), established the Navy's Special Projects Office, now Strategic Systems Programs (SSP) [Ref. 6]. SSP's mission was to design, develop, and deploy a submarine-launched nuclear deterrent in response to the USSR's development of space launch capability. Rear Admiral (RADM) William Raborn was appointed as its first Director and was provided virtually unlimited authority and resources to fulfill the mission, as supported by the following passage from the declassified "top secret" memorandum from Admiral Burke to RADMs Clark (OP-51) and Raborn.

If RADM Raborn runs into any difficulty with which I can help, I will want to know about it at once along with his recommended course of action for me to take. If more money is needed, we will get it. If he needs more people, those people will be ordered in. If there is anything that slows this project up beyond the capacity of the Navy Department we will immediately take it to the highest level and not work our way up through several days.

With such a mandate RADM Raborn was able to attract a cadre of public and private sector experts and big business to form a partnership aimed at accomplishing something that had never been done before in as soon a time as possible. The foundation of the initial missile program (POLARIS A1) was performance specifications including accuracy, availability, and launch reliability specifications. The first POLARIS flight test occurred in September 1958 and on 20 July 1960 the first POLARIS A1 missile was launched from the USS George Washington. This was an astonishing technical achievement and remains a testament to what can be achieved via Government/Industry teamwork and readily available resources. Subsequently, the SWS program evolved through five successor missile developments and deployments including the POLARIS

A2 and A3, POSEIDEN C3, TRIDENT I (C4), and TRIDENT II (D5) missile programs and was a major contributor to the ending of the Cold War.

The end of the Cold War significantly impacted the SWS program's mission, standing, and budget. Although a submarine-launched nuclear deterrent continues to be a mainstay of U.S. national security there is no foreseeable plan to develop a next generation missile and associated delivery systems including launcher, guidance, fire control, and navigation subsystems. The current D5 Backfit production (conversion of four C4 configured submarines to D5 capability) has a low production rate, has been subjected to political cuts, and will at best maintain existing production capabilities through FY 06. As production efforts draw down the SWS program's industry partners will need to diversify to maintain current labor forces. Consequently, the primary function of SSP and its industry partners will be to maintain and support existing systems through an efficient fleet support and repair and replenishment program.

SSP's challenge is to continue to provide high quality support to Fleet Ballistic Missile (FBM) customers in an environment of program mission uncertainty, significantly reduced budgets, and the associated reprioritization of industry partners. PBSA may offer SSP an opportunity to leverage off its proven strengths in performance-based hardware contracting and long-term business relationships to effectively meet these challenges.

3. SWS Technical Engineering Support (TES) Services PBSA Implementation Experience

The SWS program was founded and has been executed upon the concept of sole-source, long-term business relationships with a family of contractors including, at its core, DoD giants such as Lockheed Martin, Northrop Grumman, Boeing, and General Dynamics. These relationships have fostered an environment of Government/Industry teamwork; shared technical, program, and cost risk; and a higher than average profit margin for participating Contractors due to the inclusion of performance and schedule incentives including accuracy, availability, launch reliability, logistics effectiveness, quality, and delivery into SWS subsystem production contracts. The Government has

benefited from this arrangement by receiving timely delivery and impressive hardware performance.

Since 1997 SSP has attempted to incorporate PBSA into its TES services contracts. Early attempts were generally unsuccessful but efforts have evolved over time to a point where some limited success has occurred. A quick glimpse of historical program execution reveals a decided disincentive for SWS Contractors and Government Program Managers (PMs) to incur the additional performance and contract risk associated with PBSA. Historically, SWS production efforts have been performed under Fixed-Price Incentive (FPI) or Cost-Plus Incentive Fee (CPIF) type contracts to accommodate FAR cost incentive mandates when providing performance incentives to Government contracts. The mandate is well grounded in that a performance-based contract without cost limits would likely incentivize contractors to expend vast amounts of money to obtain incremental performance improvements. On the other hand, TES services have been historically performed under a Cost-Plus Fixed Fee (CPFF) Level-of-Effort (LOE) contract type. This contract type allows maximum flexibility to expend resources on the correction of emerging problems that best serve the fleet and maintain the performance parameters of the SWS subsystems. The overarching contracting strategy is founded on the premise that deployed systems have been fielded at high performance levels, the SWS fleet is highly trained and conditioned to rely on those performance levels, and the CPFF LOE TES services contracts provide a flexible contract mechanism for the fleet, program management, and Contractors. Under this philosophy Contractors can leverage their production contracts, where the profit margin is relatively high, off of the TES services contracts, which have historically provided a large reserve of funding to trouble-shoot and correct fleet problems. The SWS fleet and program management benefit because responses to problems are generally quick and comprehensive.

PBSA implementation experience to date has resulted in problems on both the Government and Contractor ends of the acquisition. The parties have struggled with establishing a meaningful Performance Measurement Baseline (PMB) that can define activities critical to mission success and measure an Engineer's response to varying

complexities of problems. With a declining budget and a resulting increasing Trouble Failure Report (TFR) backlog SSP needs the contractual flexibility to prioritize a Contractor's work on important problems. Under a PBSA without a realistic PMB the Contractor is incentivized to meet delivery milestones by occasionally trading-off complex for simple issues. In this environment neither party has been willing to undertake the significant administrative time necessary to develop a new approach due to the old adage "if it's not broke don't fix it". In any event there is no known TES services PBSA data supporting that conversion to a PBSA would save the Government money and improve or sustain program efficiency.

B. SCOPE

The scope of this thesis will be to investigate PBSA and the feasibility of application to SWS TES services. The Researcher will draw a series of conclusions concerning PBSA policy, TES services elements in which the application of PBSA may provide Government savings and efficiencies, and successes and failures of PBSA application on the target SWS TES services arena. Drawing upon these conclusions the Researcher will provide recommendations for highest probability of success implementation methodologies and further investigation. The primary and secondary research questions that will be addressed include the following:

1. Primary Research Question

- a. Should the Strategic Systems Programs (SSP) Apply the Concepts of PBSA to Strategic Weapons Systems (SWS) Technical Engineering Support (TES) Services?*

2. Secondary Research Questions

- a. What Is PBSA and What Are the Overarching Department of Defense (DoD) and Department of Navy (DON) PBSA Policy Objectives?*

- b. What Are Major Defense Acquisition Program (MDAP) TES Services?*
- c. What Has Been SSP's Experience With TES Services PBSA Acquisition Strategies?*
- d. What Are the Significant Factors That Have Facilitated or Hindered SWS TES Services PBSA Implementation?*
- e. How Might SSP Apply PBSA Best Practices and Risk Mitigation Strategies During the Acquisition of SWS TES Services?*

C. METHODOLOGY

The Researcher will perform the thesis research in close alignment with the research questions defined above with the objective of identifying TES services elements most favorable to PBSA application and suggested implementation methodology. The thesis will be structured to discuss the following three general subsections: (1).PBSA policy foundation, DON implementation, and PBSA model definition; (2) MDAP and SWS TES services definition; and (3) SSP TES services PBSA implementation and acquisition strategy experience. The following methodologies will be used to develop each of the three subsections:

1. Subsection (1) will include a review of (a) Federal Acquisition Regulation (FAR), Defense Federal Acquisition Regulation Supplement (DFARS), and Navy Acquisition Procedures Supplement (NAPS) regulation; (b) Federal, DoD, and Navy implementing policy; (c) and various PBSA implementing guidance handbooks.

2. Subsection (2) will include the (a) definition and identification of MDAP programs through various internet reference materials, (b) review of the Defense Acquisition Management Framework contained within the new DoD 5000.2 instruction approved on 12 May 2003, and (c) definition of core SWS TES services elements through the review of TRIDENT missile, guidance, navigation, launcher, fire control, and test instrumentation subsystem contracts and associated contract files.

3. Subsection (3) will include (a) the review of contract files associated with TES services PBSA attempts within the SWS TRIDENT missile, guidance, navigation, launcher, fire control, and test instrumentation subsystems and (b) interviews with Government and Contractor personnel involved with each TES services PBSA attempt.

D. CHAPTER SUMMARY

Chapter I has introduced the thesis background, scope, and methodology. The Government considers the acquisition of commercially available services a key and growing component of its overall mission and has undergone a philosophical shift in service acquisition strategy towards PBSA. Background research has established that the DoD is the largest acquisition component within the federal budget and the DON is DoD's largest acquisition component. The DON is comprised of ten buying Commands that provide facilities, research activity, supplies, and services in support of the fleet. Overall FY 2002 DON PBSA metric data indicates that 14.8% of all DON service related actions and 18.68% of all DON service related dollars were acquired through the use of PBSA. In addition there is a wide range of performance among the System Commands with PBSA action data ranging from 5.21% to 37.67% of all service actions and PBSA dollar data ranging from 6.1% to 48.01% of all service dollars.

SSP is one of DON's buying Commands and provides our nation's submarine-launched nuclear deterrent, the SWS TRIDENT D5 Missile and associated delivery subsystems. SSP has delivered impressive hardware performance as a result of long-term business relationships with industry partners and implementation of relevant performance incentives. Limited attempts have been made to transfer successful hardware incentive experience to TES services with minimal success. This thesis will define PBSA and MDAP TES services, review SSP PBSA implementation experience, and identify TES services elements most favorable to PBSA application and suggested implementation methodology. Chapter II provides a PBSA policy foundation, the DON implementation plan, and PBSA model definition.

II. PBSA POLICY FOUNDATION, DON IMPLEMENTATION, AND PBSA MODEL DEFINITION

A. PBSA POLICY FOUNDATION

The Service Contract Act of 1965 established the Government's service contract labor standards. The Office of Management and Budget (OMB) under OMB Circular A-76 dated 4 August 1983 established the Government's policy to (1) achieve economy and enhance productivity through Government/Commercial competition of activity whenever permissible, (2) retain Governmental functions in-house, and (3) rely on available commercial sources to provide commercial products and services [Ref. 7]. Overarching legislation including the Government Performance and Results Act of 1993, The Federal Acquisition Streamlining Act of 1994, and the Clinger-Cohen Act of 1996 have emphasized that the Government must better manage its internal and acquisition processes by establishing performance requirements, accurately measuring performance, and rewarding and penalizing good and bad performance, respectively.

Much of the historical foundation of performance-based requirements is rooted in hardware development and deployment. The Navy's submarine launched ballistic missile and NASA's space programs are stunning examples of performance-based achievement. Since Government acquisition has gradually shifted to service acquisition it clearly makes good business sense for the Government to apply performance-based concepts to service requirements in an attempt to increase service delivery efficiency. The Government has reinforced this performance-based philosophy through a series of services specific policies and regulations. The Office of Federal Procurement and Policy (OFPP) under Policy Letter (P.L.) 91-2 dated 9 April 1991 provided a definition of performance-based contracting and established the Government's service contracting policy [Ref. 8]. Performance-based contracting was defined as "structuring all aspects of an acquisition around the purpose of the work to be performed as opposed to either the manner by which the work is to be performed or broad and imprecise statements of Work." Government Acquisition managers were directed to (1) use performance-based contracting methods to the maximum extent practicable when acquiring services; (2)

select acquisition and contract administration strategies, methods, and techniques that best accommodate the requirements; and (3) justify the use of other than performance-based contracting methods when acquiring services.

The Federal Acquisition Circular (FAC) 97-01 dated 22 August 1997 implemented OFPP P.L. 91-2 through the amendment of Federal Acquisition Regulation (FAR) Parts 7, 16, 37, 42, 46, and 52 [Ref. 9]. The most critical aspect of the FAC 97-01 amendment was the establishment of FAR Subpart 37.6, Performance-Based Contracting [Ref. 10]. In addition to guidance on the Statement of Work, Quality Assurance, Selection Procedures, Contract Type, and Follow-on and Repetitive Requirements aspects of PBSA, FAR Subpart 37.6 set forth general requirements as follows:

Performance-based contracts-

- (a) Describe the requirements in terms of results required rather than the methods of performance of the work;
- (b) Use measurable performance standards (i.e., terms of quality, timeliness, quantity, etc.) and quality assurance surveillance plans (see 46.103(a) and 46.401(a));
- (c) Specify procedures for reductions of fee or for reductions to the price of a fixed-price contract when services are not performed or do not meet contract requirements (see 46.407); and
- (d) Include performance incentives where appropriate.

Section 821 of the National Defense Authorization Act for Fiscal Year 2001, P.L. 106-398, directed a FAR revision to establish a preference for Performance-Based Service Contracting [Ref. 11]. Section 821 also required specific reporting on implementation results, establishment of Centers of Excellence, and enhanced training in service contracting. OMB Memorandum M-01-15 dated 9 March 2001 established that the FY 2002 PBS Contracting (C) goal was to award contracts over \$25,000 using PBSC techniques for not less than 20 percent of the total eligible service contracting dollars [Ref. 12]. FAC 97-25 dated 2 May 2001 implemented Section 821 of the National Defense Authorization Act for Fiscal Year 2001, P.L. 106-398 by amending FAR Subpart 37.102, Service Contracting Policy, to state that performance-based contracting is the preferred method for acquiring services [Ref. 13].

Specific DoD implementation objectives and timeframes were introduced on 5 April 2000 when the Under Secretary of Defense for Acquisition and Technology issued a PBSA memorandum for the Secretaries of the Military departments Directors, Defense Agencies Director, and Defense Logistics Agency establishing that, at a minimum, 50 percent of service acquisitions, measured both in dollars and actions, are to be performance-based by the year 2005 [Ref. 14]. DoD Departments were additionally directed to (1) develop implementation plans within their organizations not later than 60 days from the date of the memorandum and (2) ensure that relevant workforce take PBSA training within 12 months from the date of the memorandum. On 2 January 2002 the Under Secretary of Defense promulgated Section 821 of the National Defense Authorization Act for Fiscal Year 2001, P.L. 106-398 to the Secretaries of the Military Departments Directors, Defense Agencies [Ref. 15].

B. DON IMPLEMENTATION

The DON submitted its response to DoD PBSA direction on 11 July 2000 [Ref. 16]. The submittal contained a PBSA endorsement memorandum for distribution to DON acquisition leadership and the DON implementation plan [Ref. 17]. The PBSA endorsement memorandum disseminated the implementation plan and highlighted the following key components: (1) an announcement that electronic tools are available on <http://www.rda.hq.navy.mil>, (2) identification of target PBSA business areas, (3) a request for PBSA training plan for personnel participating in service acquisition not later than 30 October 2000, and (4) a requirement that Heads of Contracting Activities (HCAs) must provide information on PBSA accomplishment within 30 days after the end of the fiscal year.

The implementation plan provided specific information to assist the contracting activity in interpreting and executing the PBSA requirement. The implementation plan stipulated that (1) a DON contract can be categorized as PBSA if at least 80% of its dollar value met the criteria of FAR 37.6 to be categorized as PBSA, (2) standard commercial services may be considered PBSA, and (3) the plan applied to service

requirements exceeding the DD 350 reporting threshold of \$25,000. The implementation plan identified the following service contract categories to which PBSA will apply:

1. Maintenance, overhaul, repair, service, rehabilitation, salvage, modernization or modification of supplies, systems or equipment;
2. Maintenance of real property;
3. Base operations and support contracts;
4. Operation of Government-owned equipment, facilities and systems;
5. Education and training;
6. Medical services;
7. Program management support; and
8. Research and Development (less basic and applied research)

Three key overarching elements were emphasized including (1) a statement that ASN(RDA) is the focal point for implementing PBSA with DON and will issue PBSA guidance and criteria to all functional areas of the DON acquisition community; (2) identification of an outreach program which provided informational websites and training opportunities, and (3) plans for developing a DON service contracting summit. HCAs were requested to provide PBSA metrics to assess DON effectiveness in implementing PBSA. Figure 3 provides the required format for HCA metric information.

DON Performance Based Services Acquisition PBSA Contract Awards		
Command:	Period:	
Business Area:	Total Estimated Dollars	Total Number of Actions
Total Service Contract Awards		
PBSA Contract Awards		
PBSA Compliance Rate		

Figure 3
Required HCA PBSA Metric Information
(Source: From DON Implementation Plan dated 11 July 200)

Specific milestones were established which included the following key components: (1) Implementation Plan to USD(ATL) by 30 June 2000, (2) ASN(RD&A) memorandum to Program Executive Officers (PEOs)/Direct Reporting Program Managers (DRPMs)/HCAs by 30 June 2000, (3) Links to NCMA/NAPM and SAF/AQC web-based PBSA training by 10 July 2000, (4) Review and update additional links (continuous), (5) RDA Knowledge Management: Updates to promote PBSA acceptance (continuous), (6) PBSA Performance Reports by 30 October 2000 and annually through 2005, (7) PBSA Training Plans by 30 October 2000, and (8) RDA/ABM Services Contracting Summit by 1st Quarter 2001.

Finally, ASN(RD&A) notified HCAs/PEOs/DRPMs in Memorandum dated 8 May 2002 [Ref. 18] of the provisions of Section 821 of the National Defense Authorization Act for Fiscal Year 2001, P.L. 106-398 and required activities to record answers to the following questions on qualified PBSA activity: (1) Was competition increased?, (2) Did a Non-traditional Contractor participate?, (3) Did a Non-traditional Contractor get the award?, (4) Did use of authority save time? If yes, estimated PALT reduction., and (5) Did use of authority result in cost savings? If yes, estimated cost savings. A Non-traditional Contractor means a commercial contractor who would not have otherwise proposed.

C. PBSA MODEL DEFINITION

Several PBSA guides have been issued since the Government adopted PBSA as the preferred method for service contracting. The three publications referenced here are (1) “A Guide to Best Practices for Performance-Based Service Contracting” issued by OFPP in October 1998 [Ref. 5]; (2) “Guidebook for Performance-Based Services Acquisition (PBSA) in the Department of Defense (DOD)” issued by the Undersecretary of Defense for Acquisition, Logistics and Technology in December 2000 [Ref. 19]; and (3) “Seven Steps to Performance-Based Services Acquisition” (web-based) issued in January 2002 by a team comprised of members from the Departments of Commerce, Defense, Agriculture, and Treasury, the General Services Administration, and

Acquisition Solutions (Contractor) [Ref. 20]. A thorough review of these guides reveals that they are each based on a generally consistent PBSA model while the latest guide provides the most comprehensive PBSA implementation guidance. Figure 4 illustrates the PBSA Model reflecting a consolidation and condensation of the OFPP, DoD, and Seven Steps guides.

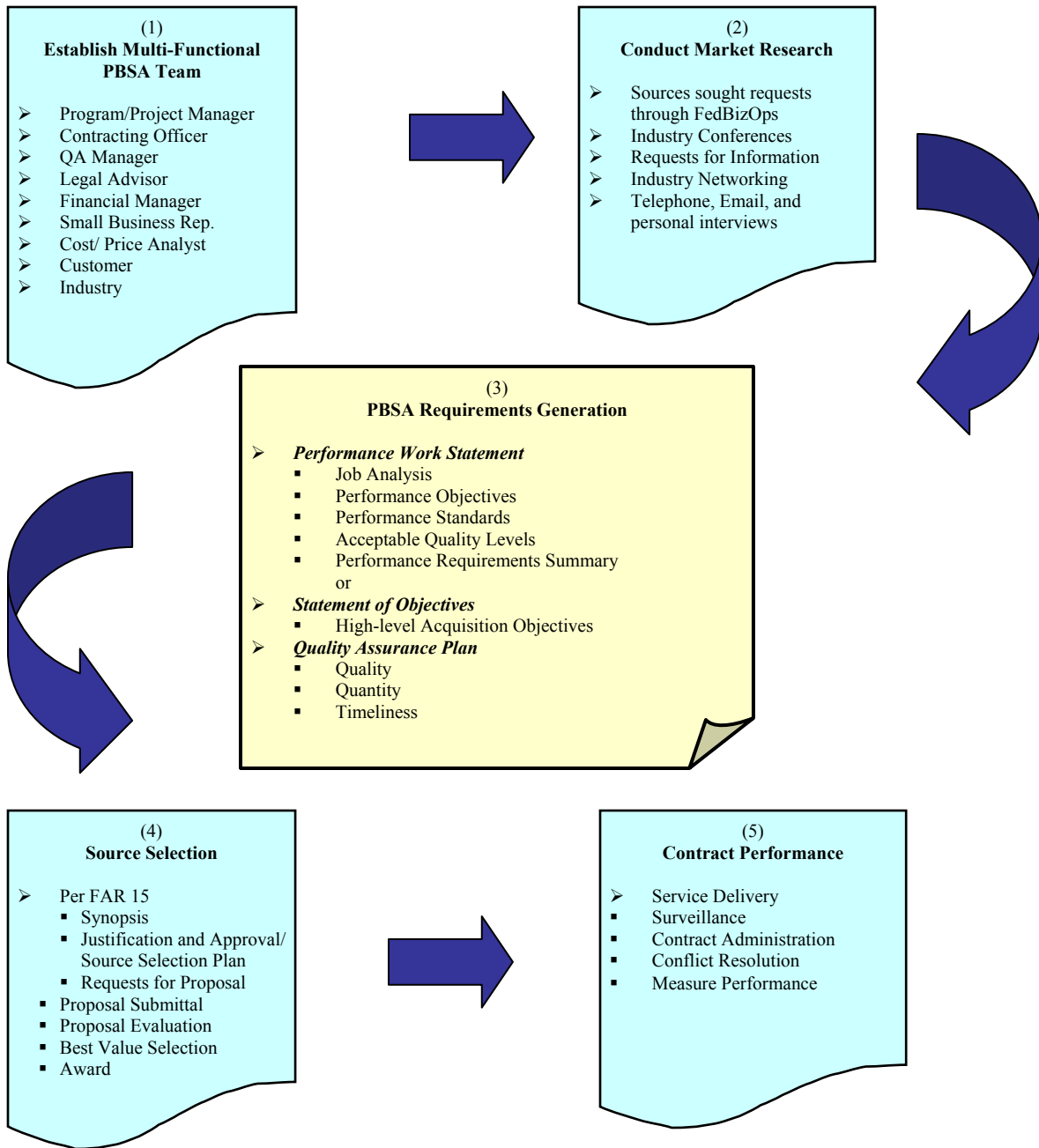


Figure 4
PBSA Model (Source: Developed by Researcher)

The key components of PBSA include the establishment of a PBSA team, market research, PBSA requirements generation, source selection, and contract management. The development of a successful PBSA effort requires significant teamwork and coordination within Government and between Government and industry. The overarching objective is to increase service delivery efficiency by providing service providers the flexibility to manage their operations in a manner that most effectively meets the Government's objectives while maximizing its profit potential. The natural offshoot of such an arrangement would be a long-term, quality-focused, business relationship that controls acquisition costs.

1. PBSA Team

The Seven Steps and DoD guides provide that establishment of a multi-disciplinary team is an important first step in a successful PBSA effort. The Seven Steps guide emphasizes team formation and performance processes. The PBSA effort can only succeed if it has the full support and cooperation of senior management either as facilitators or actual members. The team should have a charter that defines the project's objectives and the roles and responsibilities of each member. Team members should be trained to understand that team dynamics will play an integral role in product development. Standard management theory suggests that teams progress through five distinct stages including forming, storming, norming, performing, and adjourning [Ref. 21: pgs. 232-236]. To be effective the team should be required to retain its membership to the maximum extent practicable through the PBSA performance period, empowered to investigate and solve problems that will develop during PBSA development and performance, and rewarded for success.

The DoD guide recommends that the team be comprised of Government, industry, and customer/end-user personnel. Suggested functional area representation includes program/project managers, contracting officers/specialists/administrators, quality assurance managers, legal advisors, financial managers, small business managers, and cost/price analysts. The amount and type of industry representation is dependent upon

acquisition method. Under a sole source procurement effort industry representatives will be consistent and continuous members of the team throughout the PBSA life cycle. Under a competitive scenario representatives of all interested Offerors may be involved in the development of the Request for Proposal (RFP) through such processes as draft RFPs and bidder's conferences but only the successful Offeror will be a post award participant.

2. Market Research

FAR Part 10 establishes the importance of market research for all Government programs [Ref. 22]. Market research can be simply defined as the gathering and analysis of information pertinent to the market in which any given acquisition will take place and is a concept that generally applies to all private and public acquisition. Extensive market research is essential for developing and executing a PBSA contract. Since market research addresses business and technical considerations of a requirement, successful assessment requires the participation of all PBSA team members. Market research should be conducted before any documents are developed to obtain information about alternative solutions that may be available from the marketplace. The team should consider both Private-sector and Public-sector solutions to the required services. A variety of approaches may be used including issuing "sources sought requests" in FedBizOps.gov, conducting an industry conference, issuing Requests for Information (RFIs), attending industry conferences, and networking through industry points of contact for required expertise. In essence, any approach that results in obtaining information of value is acceptable. Since market conditions are continuously evolving, market research and surveillance should also be periodically conducted after contract award to ensure that the existing PBSA contract vehicle remains effective in motivating the Contractor to perform the desired outcome.

3. PBSA Requirements Generation

The DoD PBSA guide focuses on the Performance Work Statement (PWS) approach to requirements generation. The Seven Steps PBSA guide details both the PWS and Statement of Objectives (SOO) requirements generation methodologies.

a. Performance Work Statement (PWS) Approach

The PWS approach includes job analysis and the development of a Performance Requirements Summary (PRS) and PWS.

(1) Job Analysis. Job analysis involves determining what the agency's needs are, and what kinds of services and outputs are to be provided by the Contractor. The end objective of job analysis is to link the planned acquisition to the agency's mission and performance objectives. Key elements of job analysis include organization analysis, work analysis, performance analysis, directives analysis, data gathering, cost analysis, and incentive analysis.

- Organization analysis involves reviewing the agency's needs and identifying the services and outputs required from the Contractor. It should emphasize the outputs the Contractor will produce, but should not dictate how to produce these elements.

- Work analysis involves further analyzing the required outputs by breaking down the work into its lowest task level and linking tasks in a logical flow of activities. This task should start with identifying the overall service or output required from the Contractor, then break down all parts and subparts, and conclude by establishing relationships between all identified elements.

- Performance analysis involves assigning a performance element to each task. This is accomplished by developing a performance standard level required by the Government and establishing an Acceptable Quality Level (AQL) for each task. An AQL sets the allowable error rate or variation from the standard.

- Directives analysis involves the review of relevant agency directives to determine which should be utilized during performance of the contract. In general, imposed directives should be held to a minimum since excessive application could undermine the effectiveness of a PBSA philosophy.

- Data gathering involves the development of an estimate of the workload to be performed, through the use of historical data or best estimate, and the items and services that the Government will furnish to the Contractor for performance of the contract. Such data is instrumental in providing the Contractor a meaningful picture of what is required so that they can provide realistic cost estimates to perform the requirement.

- Cost Analysis involves development of a cost estimate for each service or output through the use of internal historical data or commercial pricing techniques. The estimates are then used as the basis for development of a Government Cost Estimate, proposal evaluation, and the determination of positive and negative performance incentives.

- Incentives analysis involves determining the appropriateness of applying incentives to induce better quality performance. Incentives may be positive, negative, or a combination of both and should only be applied to the most important aspects of the required work. An important consideration in establishing meaningful incentives is that they should be challenging but achievable. Easily achieved incentives do not motivate innovation or efficiency. Difficult to achieve incentives may result in cost overruns as the Contractor expends resources to try to earn the incentive or dissuade the Contractor from even attempting to accomplish the desired performance.

(2) Performance Requirements Summary (PRS). The PBSA PRS details the performance objectives, performance standards, AQLs, and other related key information as desired. The PRS should be brief and clear as it will become the baseline for the PWS. It is common that the PRS is formatted in a table or matrix that allows easy association of the key information. Figure 5 provides an example PRS format.

Performance Objective	Performance Standard	Acceptable Quality Level	Surveillance Method	Incentive

Figure 5
Example PRS Format
(Source: From Guidebook for Performance-Based Services Acquisition (PBSA) in the Department of Defense (DOD))

(3) Performance Work Statement (PWS). The PWS is the translation of the results of market research and job analysis into a written document that states the required services in terms of outputs, measurable performance standards for the desired output, and an AQL for each desired output. Writers should use the PRS as a reference document and describe the requirements in accordance with FAR guidelines. An effectively written PWS will provide enough flexibility for bidders to propose alternative approaches to best solve the Government’s objectives. A poorly written PWS will generally result in bidders providing the same solution to the Government’s objectives. The PWS should be a stand-alone document with minimal reference to regulatory or other guidance.

b. Statement of Objectives (SOO) Approach

The SOO is a short document that provides the basic, high-level objectives of the acquisition and is provided in the solicitation in lieu of a Government written PWS. The SOO approach requires competing Contractors to develop, and submit within their proposals, the statement of work, performance metrics, measurement plan, and Quality

Assurance Plan (QAP). The Seven Steps guide outlines several elements that should be considered in SOO development including (1) an initial statement of how the acquisition relates to the agency's program or mission need and what problem needs solving, (2) a short description of the work scope and funding constraints (if desired), (3) a high-level performance objective, (4) assurance that the acquisition objectives reflect agency strategic planning to stimulate a partnership environment with the Contractor, (4) a clear and concise identification of performance constraints, and (5) acquisition background and environment.

c. Quality Assurance Plan (QAP)

The QAP defines what must be done to ensure that the contractor has performed in accordance with the PWS performance standards. In a PWS requirements generation approach the Government provides the QAP in its solicitation. QAPs are proposed by the Contractors when using an SOO requirements generation approach. The QAP should be developed based on the premise that the Contractor rather than the Government is responsible for managing and ensuring that quality controls meet the terms of the contract. The QAP is an evolving document that describes how the Government personnel will evaluate and assess Contractor performance. The QAP should outline the acceptance process and should state how acceptance of services will occur. The detail in the QAP should be commensurate with the importance of the task and focus on the quality, quantity, and timeliness of the performance outputs. Development of the QAP allows the Government to clearly define the amount of contract administration resources needed. It should also be coordinated with the Contractor Quality Control Plan to ensure that duplicate administrative effort does not occur. The QAP should contain a surveillance schedule and clearly state the surveillance methods to be used. Common assessment methods include 100% inspection, random sampling, periodic sampling, trend analysis, customer feedback, and third-party audits.

d. Source Selection

FAR Parts 14 [Ref. 23] and 15 [Ref. 24] provide detailed prescriptions for the sealed bidding and contracting by negotiation acquisition processes, respectively. This thesis focuses on the contracting by negotiation process since a best value selection is preferred for subject matter services. The general processes involved within contracting by negotiation include issuance of a synopsis, Justification & Approval (J&A) or Source Selection Plan (SSP) development, development and release of a RFP, proposal development and submittal, proposal evaluation, best value selection, and award. Each PBSA requirement should be reviewed to determine which contract type is most likely to motivate the Contractor to perform. The preferred contract types are fixed-price and incentive. However, cost-reimbursement contracts are allowable when services can only be defined in general terms or definitive service requirements and/or scope is not completely known at the onset.

The choice of PBSA requirements generation approach may significantly affect the timing and complexity of RFP development, proposal development, and proposal evaluation. The RFP will contain the PWS or SOO and, if required, a QAP, as well as other standard elements including applicable clauses and source selection criteria. An RFP with a PWS will take more time to develop and is more complex than a SOO based RFP because the Government develops and establishes a detailed requirement. The Contractor's proposal process in response to a RFP with a SOO will require more effort than a PWS based RFP because the Contractor will be developing the statement of work, performance measures and metrics, surveillance methods, and QAP. Proposal evaluation must follow guidelines established in the Source Selection Plan and RFP regardless of the type of requirement. However, evaluation of a SOO based acquisition will likely take longer and be more complex because Contractors are encouraged to develop their best solution to satisfy the Government's requirement(s). Evaluations that compare a number of different approaches are generally more complicated than evaluations of similar approaches.

e. Contract Performance

PBSA contract performance consists of general efforts including service delivery, surveillance, contract administration, conflict resolution, and performance measurement. The chance of performance confusion and conflict may be greatly reduced in each of these efforts if (1) the PBSA team thoroughly considers all contract performance issues when developing the PSW, SOO, and RFP and during proposal evaluation and (2) a post-award orientation is conducted to ensure that the Contractor and Government completely understand their roles in the contract arrangement. A brief synopsis of each effort is provided below.

(1) Service Delivery. The Contractor should provide service in the quantity and quality specified within the resulting PBSA contract. The provided service may include direct and indirect labor and could include such functional areas as “touch” labor, program management, financial management, quality management, contract management, and resource management.

(2) Surveillance. Surveillance must be performed as stated in the QAP during the performance period. A good QAP includes a surveillance schedule and clearly states the surveillance method to be used. The amount of surveillance effort of Government and Contractor personnel are clearly dependent upon Past Performance Information (PPI) and the QA method used, i.e. 100% inspection, periodic inspection or insight obtained via Process Oriented Contract Administration Services (PROCAS). A good surveillance process provides confidence within the business relationship that the proper service is being provided and that a mechanism is in place for problem detection and resolution.

(3) Contract Administration. Contract administration involves a wide variety of activities that the Government and Contractor perform to ensure that the contractual requirements are met. PBSA contracts should have streamlined activity as a result of shifting the performance focus from processes to outputs. Nevertheless, the PBSA team must structure an administrative plan that considers the nature and complexity of the service and the type of contract.

(4) Conflict Resolution. Contract performance can be significantly impacted when the parties resolve disputes through the claim and litigation processes. The PBSA team should establish a mutual understanding of potential sources of conflict and ways to resolve any problems that may arise during contract performance. Common approaches to managing conflict include (1) establishing a partnership agreement that provides remedies for problems that arise, (2) assigning an ombudsman to investigate selected complaints and recommend corrective actions, and (3) alternate disputes resolution.

(5) Performance Measurement. Performance measurement is a key ingredient to a successful PBSA. During PBSA development the PBSA team must consider what and how information will be collected to definitively assess how service is provided. In his article entitled “The Measure of Success, Performance Metrics Deserve Careful Consideration” (Contract Management, December 1999) Mark Martens presented some basic principles for successful Performance Metrics (PMs) [Ref. 25]. A review of a support services contract awarded to multiple Contractors at different locations revealed inadequate PMs had been developed that subsequently invalidated the performance measurement system as a useful tool in measuring Contractor performance. The article recommended that successful PMs should:

- define what’s important to the organization at a high level;
- relate to a result rather than a process;
- result in objective, specific, and quantifiable definitions;
- be location-neutral and fair for comparison to other sites or benchmarks;
- be sufficiently standard so as to be contractor-neutral and fair for comparison;
- include only results that are clearly under the control of the Contractor;
- lead toward comprehensive and comparable standards;
- encompass all aspects of desired performance;

- define mutually exclusive indicators so that a Contractor will not be rewarded, or penalized, twice for the same performance, unless it is desirable to emphasize a particular measure;
- be recorded over time to establish a historical baseline; and
- identify all variables that will be needed to calculate the PMs

Good PMs allow the Government to evaluate the Contractor's success in meeting contract requirements and provide Contractors with timely and meaningful feedback.

D. CHAPTER SUMMARY

Chapter II has set forth the PBSA policy foundation, DON implementation approach, and PBSA model definition as supported by various implementation guides and the FAR. PBSA policy foundation supports that the Government is focused on improving the efficiency of service acquisitions through the use of PBSA. The DON has complied with Federal and DoD policies and has developed a responsive and detailed implementation plan. A PBSA model was presented that reflected the use of the FAR and three PBSA guidance publications including (1) "A Guide to Best Practices for Performance-Based Service Contracting" issued by OFPP in October 1998; (2) "Guidebook for Performance-Based Services Acquisition (PBSA) in the Department of Defense (DOD)" issued by the Undersecretary of Defense for Acquisition, Logistics and Technology in December 2000; and (3) "Seven Steps to Performance-Based Services Acquisition" (web-based) issued in January 2002 by a team comprised of members from the Departments of Commerce, Defense, Agriculture, and Treasury, the General Services Administration, and Acquisition Solutions (Contractor).

Chapter III will define Major Defense Acquisition Program (MDAP) TES services through reviews of (a) various internet reference materials, (b) DoD interim defense acquisition guidebook dated 30 September 2002, and (c) TRIDENT missile, launcher, navigation, and guidance subsystem contracts and associated contract files.

III. MAJOR DEFENSE ACQUISITION PROGRAM AND STRATEGIC WEAPON SYSTEMS TECHNICAL ENGINEERING SUPPORT SERVICES DEFINITION

A. MAJOR DEFENSE ACQUISITION PROGRAMS (MDAPs)

1. DoD Acquisition Program Establishment

DoD acquisition programs are established as a result of detailed threat assessment and requirements generation processes set forth in OMB Circular A-109 [Ref. 26] and the Goldwater-Nichols DoD Reorganization Act of 1986 [Ref. 27]. Formative requirements generation documents include the National Security Strategy (NSS), National Military Strategy (NMS), Mission Area Analysis (MAA), Mission Need Statement (MNS), Analysis of Alternatives (AOA), and Operational Requirements Documents (ORD) [Ref. 28].

The NSS describes the U.S. strategy for world leadership, foreign policy, diplomacy, promotion of democracy, open economic markets, and deterrence. The NMS defines the environment, missions, objectives, and priorities supporting the NSS. The MAA establishes a mission need through the identification of deficiencies or opportunities in support of the NSS and NMS. The MNS documents the mission need without regard to any particular material solution. The AOA identifies cost effective material alternatives to satisfy the MNS and, upon alternative selection, lays the foundation for development of an ORD. The ORD specifies the required system capabilities and characteristics and establishes minimum acceptable operational values for broad performance parameters. Performance specifications and baselines are then generated to translate the ORD into a Request for Proposal (RFP) and resulting contract.

The requirements generation system initiates the Planning, Programming, and Budgeting System (PPBS) and Acquisition Management (AM) decision support systems. The PPBS is the process used by the legislative and executive branches to authorize and appropriate funding for selected programs. Upon receipt of funding the combat developer then uses the AM system to acquire the operational requirement.

2. DoD Acquisition Categories

DoD acquisition programs are categorized by Acquisition Category (ACAT) designation including ACATs I (various), II, III, and IV [Ref. 29]. The ACAT designation of a program determines the level of oversight for key milestones within the program's development, production, testing and deployment. Major systems receive ACATs I (various) and II designations. ACAT I programs are further defined as Major Defense Acquisition Programs (MDAPs), designated as ID or IC, or Major Automated Information Systems Acquisition Programs (MAISAPs), designated as IAM or IAC. MDAPs are designated by the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)). A program is considered an MDAP if its projected development effort exceeds \$365 million or its projected procurement effort exceeds \$2.19 billion in FY 2000 constant dollars. High dollar and politically sensitive programs typically begin as ACAT ID programs and become ACAT IC after a period of time. As of December 2002 the Navy has ten ACAT ID and sixteen ACAT IC MDAPs.

A MDAP is designated ACAT ID when the program has other special interests such as technical complexity and Congressional interest. An ACAT ID designation establishes the USD(AT&L) as the Milestone Decision Authority (MDA) and is reviewed by the Defense Acquisition Board (DAB). An MDA has the ultimate authority to make a wide range of milestone decisions for a program. The DAB supports milestone decisions and is chaired by the USD(AT&L); vice-chaired by the Vice Chairman of Joint Chiefs of Staff; and includes the USD(Comptroller), USD(Policy), USD(Personnel & Readiness), Assistant Secretary of Defense (ASD)(Command, Control, Communications, and Intelligence (C3I))/DoD Chief Information Officer (CIO), Director of Operational Test and Evaluation (DOT&E), and the component Secretaries as members. Current DON ACAT ID programs include the following [Ref. 30: p. 2]:

- AAAV - Advance Amphibious Assault Vehicle
- CEC - Cooperative Engagement Capability
- CVN(X) - Next Generation Nuclear Aircraft Carrier

- DD(X) - Future Surface Combatant Program
- LPD 17 - Amphibious Assault Ship
- SSGN - TRIDENT Conversion
- SSN 774 - VIRGINIA CLASS Submarine
- T-AKE - LEWIS AND CLARK CLASS of Auxiliary Dry Cargo Ships
- 4BW/4BN - USMC Mid-life Upgrade to AH-1W Attack Helicopter and UH-1N Utility Helicopter
- V-22 - OSPREY Joint Advance Vertical Lift Aircraft

All other MDAPs are categorized as ACAT IC. An ACAT IC designation establishes the Component Acquisition Executive (CAE) as the MDA and is reviewed by a Component-level Review Board. The Assistant Secretary of the Navy (ASN) for Research, Development and Acquisition (RD&A) has been designated the Navy Acquisition Executive (NAE) for DON ACAT IC programs. SECNAVINST 5420.188E, ACAT Program Decision Process, outlines the internal DON program review process. In general, ASN(RD&A) has the flexibility to delegate decision authority and ensures that Program Decision Principal Advisors (PDPAs) are invited to attend key decision point meetings. Current DON ACAT IC programs include the following [Ref. 30: p.2]:

- AESA - Active Electronically Scanned Array Program
- AGM-88E AARGM - AGM-88E Advance Anti-Radiation Guided Missile (AARGM) Program
- AIM-9X - Air-to-Air Missile Upgrade
- CVN 68 - NIMITZ CLASS Nuclear Powered Aircraft Carriers
- DDG 51 - Guided Missile Destroyer which includes basic ship and all variants
- E-2C REPRODUCTION - HAWKEYE Carrier-Based Early Warning Aircraft
- F/A-18E/F - HORNET Naval Strike Fighter

- JSOW BASELINE/BLU-108/UNITARY - Joint Stand-Off Weapon with Baseline Variant, BLU-108 submunition, Unitary Warhead variants
- LHD 1 - Amphibious Assault Ship
- MH-60R - Multi-Mission Helicopter Upgrade
- MH-60S - Utility helicopter to replace existing CH-46D, HH-60H, SH-3 & UH-1N helicopters
- MIDS0LVT – Multi-Functional Information Distribution System-Low Volume Terminal
- SM 2 (BLOCKS I/II/III/IV) – Standard Surface-to-Air Missile 2
- T-45TS – Undergraduate Jet Pilot Training System
- TACTICAL TOMAHAWK – Follow-on to TOMAHAWK Baseline missile program
- TRIDENT II MISSILE – Sea Launched Ballistic Missile

SSP's SWS TRIDENT II (D5) Missile program transitioned to an ACAT IC designation during the 1990s after initial production quantities had been delivered and the technological baseline was established. The program was downgraded despite the fact that it still attracts significant Navy budget with a projected \$12.7B of U.S. appropriation from FY 03 through FY 08 [Ref. 31: p. 12]. However, SSP is significantly involved in the currently classified ACAT 1D conversion of decommissioned SSBN TRIDENT submarines to the SSGN configuration.

3. MDAP Acquisition Cycle and Associated Engineering Services

On 12 May 2003 the Under Secretary of Defense (Acquisition Technology and Logistics) (USD(AT&L)), Assistant Secretary of Defense (Command, Control, Communications, and Intelligence) (ASD(C³I)), and Director, Operational Test and Evaluation (DOT&E) approved the new DoD 5000.2 establishing the “Defense Acquisition Management Framework”, illustrated below as Figure 6. The new DoD 5000.2 establishes a simplified and flexible management framework for translating

mission needs and technology opportunities, based on approved mission needs and requirements, into stable, affordable, and well-managed acquisition programs that include weapon systems and automated information systems (AISs).

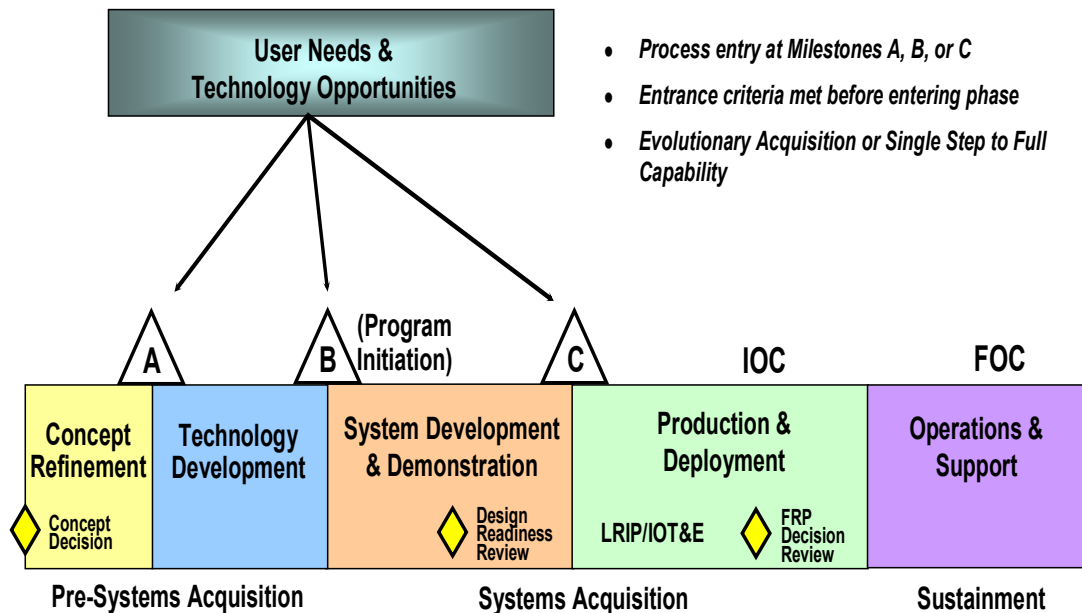


Figure 6
The Defense Acquisition Management Framework
(Source: From Department of Defense Instruction Number 5000.2)

The new Defense Acquisition Management Framework details an overarching program acquisition cycle that includes three milestone decision points (A, B, and C) and five distinct progression phases including Concept Refinement (CR), Technology Development (TD), System Development & Demonstration (SDD), Production & Deployment (PD), and Operations & Support (OS). It should be noted that Milestone decisions do not occur at the beginning of the CR phase and between Initial Operational Capability (IOC) and Final Operational Capability (FOC). A discussion of the Defense Acquisition Management Framework Implementation process is beyond the scope of this thesis. However, it is important in defining the target TES services of this thesis to establish that each phase contains service acquisition efforts.

a. Concept Refinement (CR) & Technology Development (TD) Engineering Services

Specific engineering service effort within the CR and TD phases involve concept generation and feasibility studies generally performed by members of the scientific community that may include various engineering disciplines. The CR and TD phases are normally funded with Research, Development, Test and Evaluation (RDT&E) appropriation. Maximum contracting flexibility is required during CR and TD due to each effort's significant unpredictability and to allow for the free flow of ideas and analysis. At this stage of the Government/Contractor relationship the Government generally absorbs a larger portion of contract and performance risk by establishing Cost Plus Fixed Fee (CPFF) Level of Effort (LOE) or CPFF Completion contract types. Analysis of the programmatic, budgetary, and contractual conditions within the CR and TD phases suggest that the conversion of associated engineering services into a PBSA arrangement would be a significant challenge and would likely be unsuccessful since the nature of the effort is highly unpredictable and development of a performance measurement baseline would be considerably subjective.

b. System Development & Demonstration (SDD) Engineering Services

Specific engineering service effort within the SDD phase involves the conversion of scientific concepts into a practical engineering model, design, and prototype. Important system performance, design, and cost trade-offs occur during the SDD phase. RDT&E appropriation is normally the funding source during the early stages of the SDD phase. As the design characteristics become more stable the funding source may transition to the procurement accounts including Weapons Procurement (WP), Other Procurement (OP), and Ship Construction (Navy Only) (SCN) appropriations. Maximum contracting flexibility is still required within the SDD phase although the effort reflects a transition from the purely scientific to the engineering development arena. At this stage of the Government/Contractor relationship the Government still generally absorbs a larger portion of contract and performance risk by

establishing CPFF LOE or CPFF Completion contract types. In some instances a Cost Plus Incentive Fee (CPIF) contract type with or without specific performance incentives (i.e. accuracy of a weapons system) is used in an attempt to control cost and motivate the Contractor to achieve required system performance levels. Analysis of the programmatic, budgetary, and contractual conditions within the SDD phase suggests that the conversion of associated engineering services into a PBSA arrangement would be difficult because the effort remains highly unpredictable and development of a performance measurement baseline would still be considerably subjective.

*c. **Production & Deployment (PD) Engineering Services***

Specific engineering service effort within the PD phase involves the conversion of a system design and prototype into a producible and testable system. Normal funding sources during the PD phase include the WP, OP, and SCN accounts and may include Operations and Maintenance (O&M) appropriation. At this stage of the Government/Contractor relationship the Contractor should accept a larger portion of contract and performance risk through the establishment of CPIF or Fixed Price Incentive (FPI) contract types with refined performance incentives attached to critical system performance characteristics. Although adequate Contractor performance data should be available by the PD phase to support the implementation of performance-based hardware acquisition a PBSA arrangement would pose some difficulties in establishing an agreeable performance measurement baseline. Historical engineering services data collected during the SDD phase could not reasonably be used to project PD phase engineering services effort because the nature of the efforts in the two phases are substantially different. Engineering services within the SDD phase predominantly involve senior-level engineers and costlier engineering disciplines including hardware and software design, systems, and software engineers whose primary objective is to develop, test, and build a low quantity of systems that can meet the mission need. Early stage PD phase effort focuses on the producibility, quality assurance, reliability, and maintainability of the developed system and requires a different skill mix involving leaner (more junior personnel) and less costly (on average) engineering disciplines

including electrical, manufacturing, and industrial engineering. Later stage PD engineering service effort may provide an opportunity for PBSA since metric information collected during early stage effort can be used to establish acceptable performance and quality standards.

d. Operations & Support (OS) Engineering Services

Specific engineering service effort within the OS phase relates to the operational sustainment and upgrade of deployed systems. The predominant funding source for OS operational sustainment effort is O&M. OS upgrade efforts may be funded with WP, OP, SCN, and O&M,N appropriations. At this stage of the Government/Contractor relationship the Contractor normally accepts a significant portion of the contract and performance risk through the establishment of FPI and Firm-Fixed Price (FFP) contract types with performance incentives attached to firm system performance targets. MDAPs remain in the OS phase until system disposal. By this stage of a MDAP the Contractor has collected substantial system and labor force performance data that can be relied upon to adequately project target performance levels and establish a realistic performance measurement baseline. The engineering labor mix within the OS phase should generally align with engineering services actuals incurred during the PD phase for early OS phase efforts. A more correlative engineering labor mix exists between early stage OS phase actuals and later stage OS phase efforts.

The objective of this thesis is to explore the application of PBSA on MDAP engineering services within the OS phase. The Researcher considers this target engineering service area to have a relatively high probability for successful conversion into a PBSA arrangement compared to other stated Defense Acquisition Management Framework phases. In addition, a recent GAO report to the Subcommittee on Readiness and Management Support, Committee on Armed Services, U.S. Senate presented the following finding:

Traditionally, development and procurement have accounted for about 28 percent of a weapon's total ownership cost, while costs to operate,

maintain, and dispose of the weapon system account for about 72 percent of the total. For a number of years, the department's goal has been to spend less on supporting systems and to devote more funds to development and procurement in order to modernize weapon systems. But, in fact, growth in operating and support costs has limited the department's buying power. [Ref. 32: p. 4]

This GAO finding makes it clear that the largest element of a weapon's total ownership cost is OS and that the DoD must focus on developing processes that contribute to reducing operations, maintenance, and disposal costs to free up funding for the development of new weapons systems. Successful application of PBSA principles during engineering services efforts occurring within the OS phase may be one process that can help control an MDAP's total ownership cost.

B. STRATEGIC WEAPONS SYSTEM (SWS) PROGRAM STRUCTURE AND TECHNICAL ENGINEERING SUPPORT (TES) SERVICES DEFINITION

1. SWS Subsystem Structure and Planned Funding Profile

Key hardware elements of the SWS include the missile, guidance, launcher, fire control, navigation, and test instrumentation subsystems. The SWS is a fully deployed system residing in the OS phase of the Defense Acquisition Management Framework. Table 2 provides the aggregate FY 04 through FY 08 SWS planned funding profile by appropriation for each major subsystem in then year \$M.

Table 2
Aggregate FY 2004 through FY 2008 SWS Subsystem Funding

SSP Branch	RDT&E Appropriation	WPN Appropriation	OPN Appropriation	O&M,N Appropriation	SCN Appropriation	Total
Missile	352.0	2848.9	14.6	1105.8	6.0	4327.3
Guidance	235.5	746.1	0.0	701.2	0.0	1682.8
Navigation	5.7	0.0	138.3	360.2	0.0	504.2
Launcher	64.1	0.0	109.7	261.4	55.8	491.0
Fire Cont.	0.0	0.0	130.7	109.6	22.8	263.1
Test Inst.	0.0	0.0	18.7	117.8	8.4	144.9
Total	657.3	3595.0	412.0	2656.0	93.0	7413.3

(Source: From Acquisition Plan (AP) No. SSP-83-1M)

Relatively minor production efforts and system modification efforts, including D5 Backfit and Life Extension, remain active and are funded with WPN, OPN, and SCN procurement accounts. The predominant missile and guidance subsystem funding account is WPN because SSP is still in production of “fly away” hardware and each subsystem includes minimum annual production quantities in order to maintain production capability. The O&M,N appropriation accounts for nearly 36 percent of the planned aggregate FY 04 through FY 08 SWS funding. The missile and guidance subsystems account for 68% of the overall O&M,N funded effort. The predominant funding appropriation for all other subsystems is O&M,N. The funding profile demonstrates that a significant portion of the planned aggregate effort from FY 04 through FY 08 relates to operational support.

2. SWS Organizational and Program Management Structure

The SWS program was conceived and has been executed within a framework of long-term, sole-source Integrated Product and Process Development (IPPD) teams and Integrated Process Teams (IPTs) involving several geographically dispersed large defense Contractors and SSP field activities. Lockheed Martin supports the (1) missile subsystem through its Space Systems Company (LMSSC) division of Sunnyvale, CA and (2) navigation subsystem through its Naval Electronics and Surveillance Systems (LMNE&SS) division of Mitchel Field, NY. General Dynamics Advanced Information Systems (GDAIS) of Pittsfield, MA supports the fire control and launcher subsystems. Charles Stark Draper Laboratory (CSDL), a non-profit organization, of Boston, MA supports the Guidance Subsystem. Northrop Grumman Marine Systems (NGMS) supports the launcher subsystem. The Boeing Company (Boeing) of Anaheim, CA supports the navigation subsystem. L3/Interstate Electronics Corporation (IEC) supports the test instrumentation subsystem. Myriad other companies support the SWS program but this thesis focuses on engineering services contained within annual support contracts awarded to those companies specified above.

The organizational structure of SSP headquarters located in Washington, D.C. includes (1) individual, semi-autonomous SSP technical branches managing the missile and test instrumentation subsystems, missile reentry program, fire control and guidance subsystems, launcher subsystem, and navigation subsystem and (2) staff function branches including contracting, legal, budget and accounting, computer services, security, administrative services, training, and weapons system integration. The technical branches report to the Technical Director. The budget and accounting, computer services, administrative services, and training branches report to the Plans and Programs Director. The weapons system integration branch functions as the weapons system prime integrator and reports to the Chief Engineer. The Technical Director, Plans and Programs Director, Chief Engineer, Head of Contracts, and General Counsel are direct reports to the Director of SSP (DIRSSP). Each technical branch contains a system sustainment and production group and is responsible for the execution of dedicated budgets that vary in size and mission.

Much of SSP's program involvement takes place via program management offices (PMO) located at each of the companies detailed above; the Strategic Weapons Facility Atlantic (SWFLANT) located in Kings Bay, GA; the Strategic Weapons Facility Pacific (SWFPAC) located in Bangor, WA; and the Naval Ordnance Test Unit (NOTU) located at Cape Canaveral, FL. The co-located PMOs provide DIRSSP with intricate knowledge of operations and performance at each of the prime contractors and serve as an extension of program authority and control. SWFLANT coordinates the final missile assembly, missile handling, and submarine on/off-load requirements for Atlantic fleet TRIDENT submarines and is cohabited with prime contractor personnel. SWFPAC coordinates the final missile assembly, missile handling, and submarine on/off-load requirements for Pacific fleet TRIDENT submarines and is also cohabited with prime contractor personnel. NOTU provides test and general supply services to the TRIDENT submarine fleet.

3. SWS Technical Engineering Support (TES) Services

SSP negotiates and awards each major SWS subsystem Contractor an annual contract for sustaining TES services [Refs.33-38: p. various]. The overarching mission of each Contractor is to maintain existing performance standards relating to SWS accuracy, availability, launch reliability, logistics effectiveness, and parts obsolescence and Commercial-Off-the-Shelf (COTS) management. Each subsystem has its own unique set of performance parameters that contribute to the overall SWS performance targets. In this respect, performance degradation in any of the subsystems could cause overall SWS performance problems. The consolidated listing of TES services defined below stems from a detailed review of the Statements of Work (SOWs) of each subsystem contract. It should be noted that contracting methodologies for each Contractor differ since a separate SSP technical branch manages each subsystem. Some contracts contain detailed specifications on how to perform sustaining TES services while others set forth broad objectives. However, regardless of the contract structure the cultural relationship between the Contractor and SSP program management and engineering functions is to provide required support at the required time as determined by jointly developed task prioritization. If an urgent need arises the parties require the contractual flexibility to reprioritize the planned tasking to meet the need. Therefore, the standard contract type is CPIF/CPFF LOE. The breadth of engineering disciplines involved in supporting these efforts include design, systems, software, electrical, manufacturing, mechanical, industrial, materials, component, test, field, quality, and logistics engineers.

A consolidated description of TES services effort resulting from an independent contract and reference document review of each subsystem includes the following 29 tasks:

- (1) Accuracy Evaluation and Maintenance Support
- (2) Analysis and Evaluations of Patrol Data
- (3) Computer Resources Support

- (4) Configuration Management Support
- (5) Contract Data Management Support
- (6) Follow-on Commander-in-Chief (CINC) Evaluation Test (FCET) and Demonstration and Shakedown Operations (DASO) Support
- (7) Fleet Documentation Support
- (8) Life Cycle Management Support
- (9) Logistics Support
- (10) Maintainability and Maintenance Support
- (11) Obsolescence Management Support
- (12) On/Off-Site Field Engineering Support
- (13) Performance Evaluation Support
- (14) Problem Identification, Investigation, and Solution
- (15) Program Management Support
- (16) Quality Assurance and Surveillance Support
- (17) Reliability Support
- (18) Repairs Support
- (19) Safety Program Support
- (20) Software Development and Maintenance Support
- (21) Strategic Programs Alteration (SPALT) Technical Assistance
- (22) Subsystem-unique equipment support
- (23) SWFLANT and SWFPAC Support
- (24) Systems Evaluations and Design Technical Assistance
- (25) Support Planning Assistance
- (26) Test Equipment Support
- (27) Test Facility Operation and Maintenance
- (28) Trouble Failure Report (TFR) Analysis and Corrective Action Reports (CARs) Support
- (29) Training Support

Each of these general categories of TES support is further decomposed within each subsystem contract. An illustration of this decomposition is the following Navigation subsystem support planning assistance sub-tasking [Ref. 35: p. 32]:

- (1) identify resource requirements for potential future program changes;
- (2) develop, control, and report program requirements and allocations;
- (3) coordinate, monitor, and expedite response to Navy communications;
- (4) develop and support program reviews and meetings; and
- (5) develop specifications, statements of work, presentations, reports and proposals arising from support planning activities.

The Contractor's proposal for the support planning assistance task provides further visibility into each subtask's level of effort, associated deliverables and delivery schedule, supporting material and travel requirements, and proposed engineering labor mix.

Detailed differences between the levels and types of support for each TES support category exist between Contractors and subsystems as demonstrated by the following performance evaluation support category comparison. Performance evaluation generally involves the collection and analysis of SWS performance data. However, subsystem efforts differ as follows: (1) Missile performance evaluation support focuses on the missile-unique efforts of propulsion system data acquisition and evaluation, missile body and test equipment evaluation, and transit accident/incident performance; (2) Guidance performance evaluation support focuses heavily on the accuracy of the missile as measured through missile flight-testing; (3) Navigation performance evaluation support focuses on submarine global positioning accuracy; (4) Launcher performance evaluation support focuses on launch reliability and effectiveness; (5) Fire Control performance evaluation support focuses on fire control responsiveness and availability, and (6) Test Instrumentation performance evaluation focuses on the operational support of missile flight tests.

C. CHAPTER SUMMARY

Chapter III has defined Major Defense Acquisition Programs by detailing how DoD Acquisition Programs are established and categorized. The Defense Acquisition Management Framework acquisition cycle and engineering services within each phase of the Defense Acquisition Management Framework were identified and discussed. The chapter then delineated the SWS program through a review of the SWS subsystem structure, planned funding profile, and SSP organizational and program management structures. Finally, a consolidated listing of TES service efforts of the various SWS subsystems was provided and discussed. Chapter IV will provide a chronological history of SSP's attempts to convert TES services to PBSA arrangements and will analyze the strengths and weaknesses of those attempts and future opportunities of PBSA application on the target services.

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IV. SWS TES SERVICES CONTRACTS AND PBSA IMPLEMENTATION REVIEW AND ANALYSIS

A. SWS TES SERVICES CONTRACTS

The general contracting philosophy within the SWS program has evolved from the annual execution of multiple contracts ranging in size and complexity supporting each SWS subsystem to an annually or semi-annually executed large dollar and complex omnibus contract supporting each SWS subsystem. Consequently, the contracting and program personnel responsible for each SWS subsystem typically execute and manage individual, large dollar contracts that contain multiple Contract Line Item Numbers (CLINS), contract types, and contract incentives. In addition, since each SWS subsystem is to a large extent managed independently, specific contract deliverables, language, and approaches differ. Table 3 provides a comparison of the six primary SWS subsystem omnibus contracts to illustrate SWS subsystem contracting differences.

Table 3
SWS Contract Comparison

Contract Number	Subsystem	Number of CLINs	Contract Types and Amount	Contract Incentives
N00030-02-C-0100	Missile	22	CPIF/CPFF LOE/Completion Options Amount \$610M	Performance Cost
N00030-03-C-0014	Guidance	5	CPFF LOE/Completion Option Amount \$91M	None
N00030-02-C-0021	Navigation	23	FPI/CPIF/CPFF LOE/Completion Options Amount \$93M	Performance Cost Schedule
N00030-03-C-0005	Launcher	19	FPI/CPIF/CPFF LOE/Completion Options Amount \$143M	Performance Cost Schedule
N00030-03-C-0008	Fire Control	17	CPIF/CPFF LOE/Completion Options Amount \$213M	Performance Cost Schedule
N00030-03-C-0007	Test Instrumentation	11	CPIF/CPFF LOE/Completion Amount \$36M	Performance Cost

(Source: Developed by Researcher)

The consolidation of efforts under such omnibus contracts has both positive and negative affects on procurement lead times, contract administration, and contract and program execution and management. A single contract reduces the number of new procurement actions, Contractor bid and proposal costs, Government procurement administration activity, and Contractor contract management while providing both the Government and Contractor additional resource management flexibility. However, the execution and administrative processing times associated with omnibus contracts are longer and the tasking more complex than simpler contracts.

Each SWS omnibus contract includes TES Services either as a separate CLIN or as a separate task within a CLIN. In addition, four of the six contracts contain TES Services associated cost and performance incentives at varying levels of sophistication as detailed in Table 4.

Table 4
SWS TES Incentive Comparison

Contract	N00030-02-C-0100	N00030-02-C-0021	N00030-03-C-0005	N00030-03-C-0008
Subsystem	Missile	Navigation	Launcher	Fire Control
TES Services Contract Type	CPIF LOE 90/10 Share Ratio	CPIF LOE 90/10 Share Ratio	CPIF Completion 80/20 Share Ratio	CPIF LOE 90/10 Share Ratio
Performance Incentives	<ol style="list-style-type: none"> 1. Reliability 2. Readiness 3. Quality 4. D5 Instrumentation 5. D5/C4 Flight Termination Systems 	<ol style="list-style-type: none"> 1. Accuracy 2. Availability 3. Launch Reliability 4. Logistics Effectiveness 5. COTS Management 	<ol style="list-style-type: none"> 1. D5 Launcher Subsystem Test Countdown Delays 2. D5 Launcher Subsystem Launch Countdown Delays 3. D5 Launcher/Missile System Performance 4. Missile Launch Failure 5. On-Load and Off-Load Performance 6. Missile Handling Equipment Availability 7. D5 IETM Development 8. Logistics Provisioning 	<ol style="list-style-type: none"> 1. System Effectiveness 2. Fire Control System Performance 3. Software Performance 4. Documentation Performance 5. TFR/CAR Turnaround Time 6. Documentation Deliveries 7. Transaction Item Record Processing 8. System Material Availability 9. OD 36190 Management 10. Management of Diminishing Manufacturing Sources 11. Problem Report Processing 12. Allowance Parts List Quality

(Source: Developed by Researcher)

The SWS missile subsystem performance incentive approach can be described as overarching while the SWS navigation, launcher, and fire control subsystems incorporate both overarching and targeted performance incentives approaches. An overarching performance incentive can be defined as an incentive that is associated with key hardware performance parameters but is applied against TES services. Examples of overarching performance incentives include missile subsystem reliability, navigation subsystem accuracy, launcher subsystem launcher/missile system performance, and fire control subsystem effectiveness. The general philosophy behind the overarching performance incentive approach is that the existing levels of performance associated with the TRIDENT missile and its delivery systems can't be sustained without excellent TES services delivery. Intuitively then as long as hardware performance is sustained the TES service delivery is excellent and the Contractor has earned maximum incentive. The Contractor loses portions of the available performance incentives if the system performance level drops and may even be assessed a negative incentive if the system performance drops to unacceptable levels.

In contrast a targeted performance incentive can be defined as an incentive that is associated with a particular TES services element. Examples of targeted performance incentives include navigation subsystem logistics effectiveness, launcher subsystem D5 Interactive Electronic Test Manual (IETM) development, and fire control subsystem TFR/CAR turnaround time. The general philosophy behind the targeted performance incentive approach is to incentivize specific important TES service elements that directly affect the overall system performance. To illustrate this point the navigation subsystem logistics effectiveness TES service element is a key contributor to overall navigation subsystem performance elements. High levels of logistics effectiveness can lead to high levels of system performance while logistics effectiveness degradation can result in deteriorating system performance. A TES service element can be designated important as a result of experienced performance problems or because of the magnitude of its contribution to system level performance.

Another relevant contract factor to consider is the maximum positive and negative performance incentive amounts associated with each TES services related CLIN. It

should be noted that, with the exception of the SWS missile subsystem, Table 3 performance incentives are paid from Accounting Classification Reference Numbers (ACRNs) specifically assigned to the TES services CLIN. The SWS missile subsystem performance incentive payments are allocated to ACRNs contained in the hardware production and TES services CLINs with 68.4 percent of each earned incentive paid from ACRNs within the production CLIN and the other 31.6 percent paid from an ACRN within the TES services containing CLIN. Table 5 provides comparative FY 03 total contract, TES services CLIN, and positive and negative incentive amounts for each incentivized SWS subsystem TES services CLIN.

Table 5
FY 03 SWS Contract, TES Services, and Applicable Incentive Dollar Comparison (\$000)

Contract	N00030-02-C-0100	N00030-02-C-0021	N00030-03-C-0005	N00030-03-C-0008
Subsystem	Missile	Navigation	Launcher	Fire Control
Total Contract Amount	\$610,000	\$33,314	\$57,117	\$89,966
TES Services CLIN Amount	\$136,680 (22.4%)	\$26,243 (78.8%)	\$31,614 (55.3%)	\$18,662 (20.7%)
Maximum Positive Performance Incentive	\$8,574 (6.3%)	\$1,350 (5.1%)	\$825 (2.6%)	\$440 (2.4%)
Maximum Negative Performance Incentive	-\$8,574 (-6.3%)	-\$1,200 (-4.6%)	-\$975 (-3.1%)	-\$440 (-2.4%)

(Source: Developed by Researcher)

Table 5 indicates the following: (1) the incentivized SWS subsystems TES services efforts range from 20.7% of overall FY 03 effort in support of the fire control subsystem to 78.8% of overall FY 03 effort in support of the navigation subsystem with a mean of 27% and (2) maximum positive and negative performance incentives range from 2.4% of TES services price in support of the fire control subsystem to 6.3% of TES services price in support of the missile subsystem with a mean of 5.2%. The data indicate that incentivized SWS subsystem TES services comprised a significant portion of the overall SWS subsystem effort during FY 03 and that SSP offers SWS Contractors the

opportunity to earn substantial additional profit to maintain SWS performance levels through exceptional TES services delivery.

An important contract related issue to note is in the area of contract reporting metrics. PBSA efforts are reported from major DON buying Commands to ASN through two channels including DD 350s and HCA reporting metrics. The DD 350 provides DOD and DON management with a wide array of business information concerning any individual action in excess of \$25,000. Line B1E [Ref. 39] provides the requirement to report whether an action is a performance-based service contract. The data input person is instructed to enter code Y (for yes) when at least 80 percent of the contract value is for work that is performance-based and code N (for no) when code Y does not apply. As detailed in Chapter II, Section B of this thesis the DON PBSA Implementation Plan requires HCAs to annually report PBSA metric information including the total estimated dollar value and numbers of actions related to service contract and PBSA contract awards. Although the “80 percent rule” is stated within the plan the applicable service contract categories are limited whereas the DD 350 applies to all actions. This instruction disconnect could result in discrepancies between the two data sources that may raise concerns as to the validity of PBSA reporting metrics.

A review of the SWS subsystem contract data provided in Table 5 highlights an additional problem in contract reporting on omnibus type contracts. The application of DD 350 Line B1E instruction to the individual SWS subsystem omnibus contracts would result in no PBSA dollars or actions reported when, arguably, SSP could report nearly \$214M of PBSA activity. In light of the intense pressure placed on buying Commands to convert service acquisitions to PBSA this interpretation issue could lead to further discrepancies in the two data sources.

B. SWS PBSA IMPLEMENTATION

1. Overarching Performance Incentives on CPIF LOE Contracts

SSP has been applying system level performance incentives to CPIF LOE SWS subsystems TES service related CLINs since the late 1980s starting with the missile

subsystem contract and more recently with the navigation and fire control subsystems contracts. Additionally, SSP has iteratively incorporated “intelligent” performance-based contracting language in service areas where it makes sense to let the Contractor determine how to provide service. Philosophically, such language conversion is difficult in the case of a nuclear program where the Government is rightly held accountable for safety. In reality much of the current contract language remains tightly specified by the Government. Each transitioned SWS TES services effort had originally been performed under CPFF LOE contract types. Each contract additionally contained a fee reduction provision stipulating the following:

If the Contractor does not expend the total man-hours during the contract term, the Contracting Officer shall unilaterally modify the contract to either (1) reduce the contract fee by that amount which bears the same proportion to the contract fee as the number of unexpended man-hours bears to the total man-hours, or (2) require the Contractor to continue to work until the total man-hours are expended (consistent with the "Limitation of Cost" or "Limitation of Funds" clause).

Therefore, under the terms of the contract the Contractor was motivated to deliver the negotiated amount of hours or incur a proportional fee reduction. This contracting approach worked well in an environment where funding was plentiful as was the case on the SWS program through the late 1980s. Performance levels were maintained due to the high levels of Contractor expertise assigned to the SWS program and overruns were quickly funded. However, the approach became less attractive when the SWS program’s mission, standing, and budget were significantly reduced at the end of the Cold War. Theoretically the displacement of expertise from the SWS program could result in unacceptable system performance degradation. In this era of declining budget and resulting loss of Contractor business base SSP needed to implement a contracting approach that would incentivize the SWS program’s business partners to retain key employees, control cost growth, and sustain system performance levels. As a practical matter the offering of performance incentives to Contractors for CPIF LOE services provides them with a high rate of return on their investment with minimal performance risk. Conversely, the SWS program benefits because the Contractor is tasked to make

cost/performance trade-offs in managing the skill level of assigned personnel. The Contractor's assignment of a high skill level of personnel makes the sustainment of system performance levels highly probable but risks fee reduction from both the failure to deliver the required hours, in accordance with the retained fee reduction provision, and the failure to stay within the target cost of the contract. Vice versa the Contractor's assignment of a low skill level of personnel makes delivering the required hours and staying below the target cost probable but risks fee reduction associated with reduced system performance levels.

The conversion from a CPFF LOE to CPIF LOE contract structure did not materially affect the negotiation and contract development processes. Cost proposals were based on ample and comparable performance history resulting in straightforward audit and cost negotiation processes. Little disagreement occurred during fee negotiations since the Contractor received higher profit for performing substantially the same effort. Contract terms and conditions were mostly unchanged and the "Limitation of Cost" and "Limitation of Funds" clauses remained applicable providing the Government with unchanged protections against cost overruns.

Results of this contracting approach have been successful for the Government resulting in retention of a skilled labor force despite the industry-wide boom and bust of the 1990s and early 2000s, adequate cost growth notification and control, little additional administrative effort, and excellent sustained system level performance. In fact, SWS performance levels under the cited contracts have not degraded over time and cost control has been generally maintained during an environment when the amount of contract dollars awarded to SWS Contractors has declined significantly. The contracting approach has also been successful for the Contractors since their rate of return on investment for low cost and performance risk effort has increased substantially and a stable minimum volume of long-term work has been virtually assured. Further, the quality of the delivered service did not change and quality measurement did not create a programmatic or administrative problem for the parties since the deliverable (hours) did not change when converted from a CPFF LOE to CPIF LOE contract type.

2. Overarching Performance Incentives on Completion Contracts

SSP has attempted to implement a FPI completion contract type for SWS navigation subsystem TES services and has implemented a CPIF completion contract type for SWS launcher subsystem TES services in conjunction with an overarching performance incentive philosophy. The philosophical contracting shift caused some adjustments in service delivery under the contracts discussed below and in the associated business relationships between SSP and the responsible Contractors. CPFF LOE contracts had been exclusively used for TES services under all predecessor contracts for both subsystems. Completion contract types have not attempted on the SWS missile and fire control subsystems TES services because of perceived performance risk.

a. FPI Completion Contract Type

The FY 99 SWS navigation subsystem TES services effort was contracted for under a FPI contract type [Ref. 40]. The Contractor's cost proposal was developed using adequate historical CPFF LOE data making it relatively easy to audit and negotiate. Fee negotiations were in turn expeditious. The Contractor eagerly accepted the opportunity to earn a higher base fee, due to allowances for contract type risk associated with FPI rather than CPFF LOE efforts [Ref. 41], and performance incentives for effort that had previously had no incentives. The complicated portion of the conversion occurred during development of the associated contract language. The Government and Contractor agreed to establish and identify deliverables in an Exhibit of the contract primarily based on historical Contract Data Requirements Lists, CDRLs. Specific implementing contract language for the FPI effort (Item 0001) was subsequently placed in Sections B, C, F, and H and in Exhibits A - Item 0001 Exhibit Line Item (ELIN) Description and H - Incentive Plan. Sections B, C, and F reflected standard language directing the reader to Exhibit A. Exhibit A contained ELIN description, quantity, unit and extended billing price, delivery schedule, and shipment information for forty-six individual ELINs. Exhibit H contained detailed incentive implementation information

including description, measurement method and conditions, and award determination procedures for accuracy, availability, launch availability, logistics effectiveness, and COTS Management performance incentives.

The contract contained two special provisions in Section H relating to the FPI effort including the following: (1) Special Provision in Regards to the Contractual Incentive Structure and (2) Pre-negotiated Reduction for Revised Deliveries (Applicable to ELINs A001, A002 and A005). The first provision specified performance incentive payment instructions since multiple ACRNs were involved. The second provision addressed mutual concerns regarding the delivery quantity of SSBN Arrival Inspections, SSBN Upkeep Reports and TFR Response Summaries as specified in ELINs A001, A002 and A005. The parties agreed that the Contractor was not in control of the required quantities for each and agreed to incorporate protective language covering deliveries, billing price/target price adjustments, proportional allocations, prior adjustments, and diminished requirements. Protective language specific to ELIN A005, TFR response summaries, is detailed below as an example.

- c. In the event the Contractor delivers less than the combined minimum quantities (as specified in Exhibit D) for all lots under ELIN A005, the Contracting Officer shall reduce the extended billing price under ELIN A005 and the target price of Item 0001 by the following amount:

$$(348 - \text{quantity delivered}) \times \frac{\text{Extended Billing Price of ELIN A005}}{348}$$

The unit billing price shall be reduced by the following amount:

$$\frac{\text{Revised Extended Billing Price of ELIN A005}}{4}$$

Although the parties were able to agree on the contracting approach and implementing language the actual performance results were unsuccessful due to interpretive problems on both sides of the business relationship. The final Item 0001 cost position reflected an overrun of approximately five percent. The overrun resulted in extraordinary upper-level management attention by both parties although it fell well within the established ceiling price of 120 percent of target cost. The historical

programmatic and budgetary philosophy was to manage to target. Under a CPFF LOE contract the “Limitation of Cost” clause provides the Government enough advanced planning information to either stop work or increase funding. Since historical performance had generally run to target the Comptroller had not adequately reserved funding to cover the overrun and the Command had to take unusual and unplanned steps to cover the liability or face an Anti-Deficiency Act (ADA) violation. Of greater concern was the increased program friction resulting from ingrained contract performance culture and the increased Contractor focus on profit maximization. SSP program personnel were accustomed to unimpeded support and complete flexibility in mission reprioritization, if required, as allowed within a CPFF LOE contracting environment. Conversely, the Contractor was reluctant to perform tasks that were not specifically established within an Exhibit A ELIN due to the profit implications of an FPI arrangement. These opposing views led to friction between the parties and significantly increased program and administrative involvement by the Contracting Officer.

Of final concern was the virtual impossibility of determining whether a deliverable met the intended quality standard. This is directly attributable to the fact that quality standards had historically been specified in an overarching control document entitled “T9001A - Technical Program Management and Quality System Requirements for Navy Strategic Systems Programs Acquisitions with Requirements Applicability Matrix”. When conversion occurred the parties agreed to retain the existing quality documentation instead of generating concrete quality standards per Item 0001 ELIN. Without individual quality standards neither the Government nor the Contractor could easily rate the delivered performance, proof of which was usually transmitted in the form of a report, and the default acceptance criteria simply became the verification that a report was actually submitted. These experienced contract and performance management problems resulted in reassessment of the contracting approach, eventually resulting in the implementation of a CPIF LOE contracting philosophy with overarching performance incentives beginning in FY 00 and for all subsequent SWS navigation subsystem effort.

b. CPIF Completion Contract Type

The FY 01 SWS launcher subsystem TES services were contracted for under a CPIF completion contract type [Ref. 42]. As was the case in the FPI attempt discussed above the Contractor's cost proposal was developed using adequate historical CPFF LOE data making it relatively easy to audit and negotiate. Similarly, fee negotiations were expeditious. However, the contract language development approach differed substantially from that used in the FPI effort. Instead of an in-depth tasking breakout and pricing exercise of the previously performed CPFF LOE effort the Government and Contractor agreed to price the effort using a bottom-line approach, incorporate maximum flexibility in the contract language, and establish deliverables within a special Exhibit that referenced specific CDRL Items. Implementing contract language for the CPIF effort (Item 0005) was subsequently placed in Sections B, C, and F and in Exhibits C - FY 01 C4/D5 Launcher Subsystem Support for Deployed SSBNs, F - CDRLs, and T - Incentive Plan. Sections B, C, and F reflected standard language directing the reader to Exhibits C and F.

Exhibit C contained only two ELINs, C001 and C002, that individually referred to a unique CDRL. ELIN C001 referred to CDRL F00X – Quarterly Summary Progress Report and ELIN C002 referred to CDRL F00Y – Quarterly Incentive Claim Report. An important element of Exhibit C was the following clarifying language:

Quarterly Summary Progress Reports include summary of progress for Item 0005 completion CDRLs F001, F002, F004, F006-F00A, F00C-F00F, F00H, F00L-F00R, F00S-F013, F015-F01E, F01J-F01R, and F01Z-F023

The language clarifies that the Exhibit C ELINs are simply transmittal documents and clearly establishes that the CDRLs are the lower level deliverables of the contract. Exhibit F then established the detailed descriptive language and delivery requirements for each completion deliverable. Exhibit T contained a detailed incentive summary, incentive determination, and accomplishment instructions for tool set development plan – launcher performance, D5 launcher subsystem test countdown

delays, D5 launcher/missile system performance, missile launch failure, on-load and off-load performance, missile handling equipment availability, IETM development, and launcher system material availability performance incentives.

The actual performance results of this flexible approach have been successful in comparison to the FPI approach. As was the case under the predecessor CPFF LOE contract type the CPIF completion contract type requires the Contractor to notify the Government of costs incurred in excess of 75 percent in accordance with the “Limitation of Cost” clause. The cost notification requirement contained within the clause provided the program office with some protection against cost overruns that helped to mitigate performance risk. The contract type was also perceived as more effective than the traditional CPFF LOE contracting approach in ensuring that the Contractor performed efforts most critical to the program office. In addition the program office experienced less resistance when requesting mission reprioritization. The Contractor was initially concerned about their potential inability to deliver firm deliverables if an emergent requirement occurred but the parties worked well together during the performance period in managing the deliverables to contract target. Therefore the overall approach resulted in a win-win scenario. The Government was provided more cost and performance control and the Contractor was provided a higher return on their investment and improved programmatic response.

Weaknesses still existed, however in determining whether a deliverable met the intended quality standard. Similarly to the FPI effort the parties agreed to retain the existing quality documentation instead of generating concrete quality standards per deliverable resulting in uncertainty as to how well a service had been delivered. The CPIF completion approach with overarching performance incentives has become the accepted contracting approach for the SWS launcher subsystem TES services effort. The parties have additionally attempted to work together in subsequent contracts to focus on areas of performance concern through a targeted incentive approach that will be discussed in the next section.

3. Targeted Performance Incentives on CPIF LOE and CPIF Completion Contracts

The natural evolution of performance incentive application is to attach incentives to those tasks that are critical to attaining system level performance or that have experienced performance problems. The Researcher refers to this activity as targeted incentive analysis and application. The parties in the business relationship must work together in identifying the targeted tasks and developing an acceptable incentive strategy to improve performance on problem tasks and sustain performance on non-problematic but critical tasks. Targeted performance incentives on the SWS program have been sporadic and relatively recent. A listing of targeted incentives on SSP SWS subsystem contracts was provided in Chapter IV, Section A above. The implementation process has been challenging despite the fact that long-term business relationships exist between the parties. The Government has had problems relinquishing process control and the Contractor has been reluctant to accept the additional performance risk and process management responsibility. In most cases the additional incentive pool amounts assigned the targeted area provide little motivation for the increased Contractor responsibility. For instance the fire control system provides incentive pools ranging in value from \$10,000 to \$60,000 over a number of targeted tasks on an \$18.6M CLIN on a nearly \$90M contract. A \$90M contract represents a small percentage of a large defense contractor's business base. An obvious question is whether the Government should expect such relatively small incentive pools to materially improve a large defense Contractor's performance. Vice versa should the Government assign larger incentive pools to lower tiered performance elements in the hopes of attaining marginal performance improvement. These answers are not easy to predict and the parties generally need to work through a performance cycle to measure behavioral changes. The increased monitoring requirement and uncertainty in achieved performance improvement raises concerns as to whether the benefits attained are worth the administrative costs of attaining them.

Indeed the future practicality of targeted incentives at SSP remains unclear as evidenced by the following actual comprehensive PBSA conversion attempt. The SWS launcher subsystem attempted to convert its entire FY 03 deployed systems support effort

(\$31M of planned budget), including TES services and other efforts, to a performance-based targeted incentive service contract. The implementation process generally followed the PBSA implementation presented in Chapter II, Section C of this thesis. An executive steering committee consisting of both SSP and Contractor senior level management was briefed on the proposed conversion and agreed to proceed. A senior project engineer was assigned as the lead for the project and attended a commercially offered PBSA training course. After completion of the individual training the project lead properly established a multifunctional PBSA team consisting of Government program and field representative personnel, Contractor counterparts, and outside Contractor support personnel as permanent team members and contracting and legal personnel as advisory team members. It should be noted that a team charter was developed but never formally approved because the executive steering committee considered it unnecessary. All permanent team members participated in an exclusive training program offered by the previously mentioned commercial provider. As part of the training the provider acted as a facilitator for team brainstorming. Team members were subsequently segregated by areas of expertise and conducted internet-based market research to determine whether the team could leverage off of another organization's PBSA conversion of similar engineering service effort in their respective assigned area. None of the individual teams were able to find any similar efforts.

The individual teams then conducted a thorough job analysis of each area. Unfortunately, the attitude towards the project changed from positive to negative as the individual groups began to report that a PBSA conversion of their particular areas would be too risky and ineffective. After a complete analysis had been performed and significant administrative costs had been incurred the parties agreed to attempt a PBSA conversion of logistics provisioning only (\$800K of the originally planned \$31M budget). The team members responsible for logistics provisioning developed a comprehensive performance work statement that provided the scope of work; documentation requirements; a performance requirements summary including an identification of required services and associated performance standards, acceptable quality levels, and monitoring methods and responsibilities; Government quality assurance roles and

responsibilities; and logistics provisioning task definitions. The team also developed two incentives specific to the PBSA effort including (1) a man-hour reduction incentive with a maximum positive incentive available to earn of \$50,000 and no negative incentive and (2) a trouble failure report reduction incentive with a maximum positive/negative incentive available to earn/lose of +/- \$25,000. The finalized package was briefed to the executive steering committee, which finally approved moving forward with a further reduced amount of PBSA tasks.

Performance results of the converted PBSA effort have not been fully assessed. Preliminary indications are that the Government is moderately uncomfortable about the change in process control while the Contractor claims that the only efficiency savings that have occurred are those associated with the reduction of Government oversight. However, the experienced PBSA conversion process performance is troubling. The environment seemed to be ripe for conversion of a significant amount of deployed systems support effort in that management had verbally bought into the idea, the PBSA model was generally followed with a few minor exceptions, participants were properly trained and focused, the parties had intimate knowledge of the required tasking and historical performance levels, and a generous incentive package was available. The disappointing results were that significant resources and administrative costs were incurred, less than two percent of the target effort was converted, participants were frustrated and would likely not volunteer for future attempts, and both Government and Contractor management ultimately balked at accepting any perceived additional risk.

C. SUMMARY ANALYSIS

The SWS program experiences with PBSA on TES services have been evolutionary but limited. In fact it is difficult to define any of the SWS subsystem efforts discussed above as 100 percent PBSA when measured against the standard model developed in Chapter II, Section C of this thesis. In all resulting contracts the Government has retained significant control and oversight of Contractor processes and performance. Nevertheless the SWS program appears to be ahead of the PBSA learning

curve when compared with other MDAPs at a minimum and possibly even with less complex efforts. From a PBSA metric reporting standpoint this fact holds true, as SSP is ahead of all other major system commands since all of the discussed TES services contracts are reported as PBSA type contracts on the associated DD 350 and through HCA reported metrics.

SSP's PBSA experience is consistent with findings from a recent GAO PBSA review. In a report to the Chairman, Subcommittee on Technology and Procurement Policy, Committee on Government Reform, House of Representatives dated September 2002 the GAO concluded that guidance is needed for using performance-based service contracting [Ref. 43]. The report focused on a review of 25 total contracts submitted by various agencies to measure against four OFPP defined essential performance-based attributes as follows: (1) Describe the requirements in terms of results required rather than the methods of performance of the work, (2) Set measurable performance standards, (3) Describe how the contractor's performance will be evaluated in a quality assurance plan, and (4) Identify positive and negative incentives when appropriate. Findings of the review were as follows: (1) nine of the contracts for services widely performed in the commercial sector clearly exhibited all of the attributes, (2) four of the contracts for services widely performed in the commercial sector were very prescriptive in how the work should be carried out, and (3) twelve contracts for more unique and complex services determined that they still needed to be prescriptive and to exert strong oversight because of safety, cost, and/or technical risks. The SWS program PBSA efforts generally fall into the last category of audited contracts. However, progress has been made with each attribute on some of the TES services elements described in Chapter III, Section C of this thesis and SSP is clearly advanced in attribute (4), identification of positive and negative incentives when appropriate.

Other considerations in future PBSA conversion attempts at SSP concern the effort's relevancy and benefits. A primary question is how does the conversion of SWS TES services to PBSA benefit the Navy and SSP? ASN(RD&A) has requested PBSA metric information to answer the following questions as detailed in Chapter II, Section B: (1) Was competition increased?, (2) Did a Non-traditional Contractor participate?, (3)

Did a Non-traditional Contractor get the award?, (4) Did use of PBSA save time?, and (5) Did use of PBSA result in cost savings? The answer to these questions based on results of the discussed SWS TES services PBSA conversion attempts would be (1) competition was not increased, (2) a non-traditional Contractor did not compete, (3) a non-traditional Contractor did not receive the award, (4) use of PBSA added rather than saved time, and (5) use of PBSA did not result in savings and in some instances resulted in additional cost. In addition, since high performance standards were designed into the SWS it is uncertain as to whether incentivizing sustained performance is meaningful. A question that should be asked is whether the application of an overarching or targeted incentive would actually impact performance given existing SWS performance standards. If it wouldn't then the Government should not offer the Contractor easily attainable additional profit. Conversely, is it reasonable to force long-term business partners to accept increased performance risk without providing additional profit opportunities? Based on the answers to these questions it appears that the complete conversion of SWS TES services to PBSA is neither practicable nor desirable.

D. CHAPTER SUMMARY

Chapter IV has presented an in-depth analysis of SWS subsystem contracts and related TES services conversion attempts to PBSA. SWS subsystem PBSA conversion was presented as having been evolutionary over at least a fifteen-year period with proven successes and failures. It was noted that four of the six SWS subsystem omnibus contracts contained some measure of TES services PBSA implementation although the number of converted TES services elements has been limited. The concepts of overarching and targeted incentives were introduced and developed. Summary analysis concluded that the SWS program will generally still need to be prescriptive and to exert strong oversight because of safety, cost, and/or technical risks. Finally, the chapter raised questions as to the benefits and relevancy of complete SWS subsystem TES services PBSA conversion. Chapter V will provide conclusions, recommendations, and answers to the primary and secondary questions that formed the basis of this thesis.

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V. CONCLUSIONS, RECOMMENDATIONS, AND ANSWERS TO RESEARCH QUESTIONS

A. OVERVIEW

This thesis provided a Department of Defense (DoD), Department of the Navy (DON), and Strategic Systems Programs (SSP) Strategic Weapon System (SWS) program acquisition and Performance Based Service Acquisition (PBSA) history background, reviewed overarching PBSA policy and the DON PBSA implementation plan, defined a working PBSA model, defined Major Defense Acquisition Programs (MDAPs), detailed the SWS program structure, defined target SWS Technical Engineering Support (TES) services, and reviewed and analyzed SWS TES service contracts and associated PBSA implementation attempts. Chapter V provides conclusions, recommendations, answers to the primary and secondary thesis research questions, and a suggestion for future research.

B. CONCLUSIONS

1. The Government Considers the Acquisition of Commercially Available Services a Key and Growing Component of Its Overall Mission and Has Undergone a Philosophical Shift in Service Acquisition Strategy Towards PBSA

In FY 1991 the percentages of dollars expended for supplies and equipment acquisition and service acquisition to overall acquisition were 44.4 percent and 33.6 percent, respectively. In FY 1999 the percentages of dollars for supplies and equipment acquisition and service acquisition to overall acquisition were 35.1 percent and 42.6 percent, respectively. In addition to the growth in service acquisition the General Accounting Office (GAO) has routinely provided testimony before the United States House of Representatives and Senate concluding that the Government is mismanaging service contracts. Background research has established that the DoD is the largest acquisition component within the federal budget and the DON is DoD's largest acquisition component. The DON is comprised of ten buying Commands that provide

facilities, research activity, supplies, and services in support of the fleet. Overall FY 2002 DON PBSA metric data indicates that 14.8% of all DON service related actions and 18.68% of all DON service related dollars were acquired through the use of PBSA. In addition there is a wide range of performance among the System Commands with PBSA action data ranging from 5.21% to 37.67% of all service actions and PBSA dollar data ranging from 6.1% to 48.01% of all service dollars.

2. Evolutionary PBSA Policy Foundation and Implementation Guidance Supports That the Government Is Becoming Increasingly Focused on Improving the Efficiency of Service Acquisitions Through the Use of PBSA

The Office of Federal Procurement and Policy Public Law (OFPP P.L.) 91-2 dated 9 April 1991 provided a definition of performance-based contracting and established the Government's service contracting policy. Federal Acquisition Circular (FAC) 97-01 dated 22 August 1997 implemented OFPP P.L. 91-2 through the amendment of Federal Acquisition Regulation (FAR) Parts 7, 16, 37, 42, 46, and 52. FAR Subpart 37.6 set forth general implementing requirements and guidance on the Statement of Work, Quality Assurance, Selection Procedures, Contract Type, and Follow-on and Repetitive Requirements aspects of PBSA. Section 821 of the National Defense Authorization Act for FY 2001, P.L. 106-398, directed a FAR revision to establish a preference for Performance-Based Service Contracting. The Office of Management and Budget (OMB) Memorandum M-01-15 dated 9 March 2001 established that the FY 2002 PBSC goal was to award contracts over \$25,000 using PBSA techniques for not less than 20 percent of the total eligible service contracting dollars. FAC 97-25 dated 2 May 2001 implemented Section 821 of the National Defense Authorization Act for FY 2001, P.L. 106-398 by amending FAR Subpart 37.102, Service Contracting Policy, to state that performance-based contracting is the preferred method for acquiring services. On 5 April 2000 the Under Secretary of Defense for Acquisition and Technology (USD(A&T)) issued a PBSA memorandum for the Secretaries of the Military departments Directors, Defense Agencies Director, and Defense Logistics Agency establishing that, at a minimum, 50 percent of service acquisitions, measured

both in dollars and actions, are to be performance-based by the year 2005. On 2 January 2002 the Under Secretary of Defense (USD) promulgated Section 821 of the National Defense Authorization Act for FY 2001, P.L. 106-398 to the Secretaries of the Military Departments Directors, Defense Agencies.

This thesis developed a PBSA model that consolidated associated FAR language and three PBSA guidance publications including (1) “A Guide to Best Practices for Performance-Based Service Contracting” issued by OFPP in October 1998; (2) “Guidebook for Performance-Based Services Acquisition (PBSA) in the Department of Defense (DOD)” issued by the Undersecretary of Defense for Acquisition, Logistics and Technology in December 2000; and (3) “Seven Steps to Performance-Based Services Acquisition” (web-based) issued in January 2002 by a team comprised of members from the Departments of Commerce, Defense, Agriculture, and Treasury, the General Services Administration, and Acquisition Solutions (Contractor). The PBSA model identified five key activities including establishment of a multifunctional team, market research, requirements generation, source selection, and contract performance. Establishment of a multifunctional team is an essential first step for successfully executing a PBSA and discussion revolved around team membership and management. The market research and source selection activities are generally consistent with other type of federal acquisitions and discussion leveraged upon existing federal regulation. Two alternative requirements generation approaches were developed including the Performance Work Statement (PWS) and Statement of Objectives (SOO). A PWS generally includes the development of a job analysis, performance objectives, performance standards, acceptable quality levels, and a performance requirements summary. The SOO is a much different requirements approach in that the Government provides the Contractor with a set of high-level performance objectives and allows the Contractor to propose a detailed performance plan. Key elements of the contract performance activity include service delivery, surveillance, contract administration, conflict resolution, and performance measurement.

3. The DON Has Complied With Federal and DoD Policies and Has Developed a Responsive and Detailed Implementation Plan Including the Identification of Key Reporting Metrics

The Assistant Secretary of the Navy for Research, Development, and Acquisition (ASN(RD&A)) was established as the focal point for implementing DON PBSA and subsequently issued PBSA guidance and criteria to all functional areas of the DON acquisition community. The DON implementation plan stipulates that (1) a DON contract can be categorized as PBSA if at least 80% of its dollar value met the criteria of FAR 37.6 to be categorized as PBSA, (2) standard commercial services may be considered PBSA, and (3) the plan applied to service requirements exceeding the DD 350 reporting threshold of \$25,000. The implementation plan also identified the service contract categories to which PBSA applies including: maintenance, overhaul, repair, service, rehabilitation, salvage, modernization or modification of supplies, systems or equipment; maintenance of real property; base operations and support contracts; operation of Government-owned equipment, facilities and systems; education and training; medical services; program management support; and Research and Development (less basic and applied research). The Heads of Contracting Activities (HCAs) were requested to provide PBSA metrics including the total service contract awards, total PBSA contract awards, and PBSA compliance rate by estimated dollars and numbers of actions in order to assess DON PBSA implementation effectiveness. Conducted research revealed that a disconnect exists between the DD 350 Line B1E (Performance-Based Service Contract) and Navy PBSA implementation plan metric reporting instructions that could result in ASN data base discrepancies that may raise concerns as to the validity of PBSA reporting metrics. Additionally, the application of DD 350 Line B1E instruction to the individual SWS subsystem omnibus contracts would result in no PBSA dollars or actions reported when, arguably, SSP could report nearly \$214M of PBSA activity. In light of the intense pressure placed on buying Commands to convert service acquisitions to PBSA this interpretation issue could lead to further discrepancies in the two data sources.

4. The Majority of DoD Funding Is Expended on MDAPs and as a Result Their Formation, Execution, and Oversight Is Complex and Evolved.

DoD acquisition programs are established as a result of detailed threat assessment and requirements generation processes set forth in OMB Circular A-109 and the Goldwater-Nichols DoD Reorganization Act of 1986. Formative requirements generation documents include the National Security Strategy (NSS), National Military Strategy (NMS), Mission Area Analysis (MAA), Mission Need Statement (MNS), Analysis of Alternatives (AOA), and Operational Requirements Documents (ORD). Performance specifications and baselines translate the ORD into a Request for Proposal (RFP) and resulting contract. The requirements generation system initiates the Planning, Programming, and Budgeting System (PPBS) and Acquisition Management (AM) decision support systems. DoD acquisition programs are categorized by Acquisition Category (ACAT) designation including ACATs I (various), II, III, and IV. The ACAT designation of a program determines the level of oversight for key milestones within the program's development, production, testing and deployment. Major systems receive ACATs I (various) and II designations. ACAT I programs are further defined as MDAPs, designated as ID or IC, or Major Automated Information Systems Acquisition Programs (MAISAPs), designated as IAM or IAC. MDAPs are designated by the USD(AT&L). A program is considered an MDAP if its projected development effort exceeds \$365 million or its projected procurement effort exceeds \$2.19 billion. There are currently 10 ACAT ID and 16 ACAT IC MDAPs within the DON. MDAPs are conceived, managed, reviewed, and approved through the Defense Acquisition Management Framework contained within the new DoD 5000.2 instruction approved on 12 May 2003. The Defense Acquisition Management Framework details an overarching program acquisition cycle that includes three milestone decision points (A, B, and C) and five distinct progression phases including Concept Refinement (CR), Technology Development (TD), System Development & Demonstration (SDD), Production & Deployment (PD), and Operations & Support (OS) with each distinct phase containing service acquisition efforts.

5. MDAP OS Phase Engineering Services Have a Relatively High Probability for Successful Conversion Into a PBSA Arrangement Compared to Other Stated Defense Acquisition Management Framework Phases

Specific engineering service effort within the OS phase relates to the operational sustainment and upgrade of deployed systems. During the OS phase the Contractor normally accepts a significant portion of the contract and performance risk through the establishment of Fixed Price Incentive (FPI) and Firm Fixed Price (FFP) contract types with performance incentives attached to firm system performance targets. Within this phase the Contractor has collected substantial system and labor force performance data that can be relied upon to adequately project target performance levels and establish a realistic performance measurement baseline. The engineering labor mix within the OS phase should generally align with engineering services actuals incurred during the PD and early OS phase efforts. Additionally, recent GAO findings make it clear that the largest element of a weapon's total ownership cost is OS and that the DoD must focus on developing processes that contribute to reducing operations, maintenance, and disposal costs to free up funding for the development of new weapons systems [Ref. 32: p.4]. Successful application of PBSA principles during engineering services efforts occurring within the OS phase may be one process that can help control an MDAP's total ownership cost.

6. SSP's SWS Program Is an MDAP With the Predominant Portion of Its TES Services Residing in the OS Phase

SSP is one of DON's buying Commands and provides our nation's submarine-launched nuclear deterrent, the ACAT IC designated SWS TRIDENT D5 Missile and associated delivery subsystems. The SWS program was conceived and has been executed within a framework of long-term, sole-source Integrated Product and Process Development (IPPD) teams and Integrated Process Teams (IPTs) involving several geographically dispersed large defense Contractors and SSP field activities. The current D5 configuration is fully deployed. Key hardware elements of the SWS include the

missile, guidance, navigation, launcher, fire control, and test instrumentation subsystems with a planned FY 04 through FY 08 budget of approximately \$7.4B in then year dollars. SSP negotiates and awards each major SWS subsystem Contractor an annual contract for sustaining TES services. The overarching mission of each Contractor is to maintain existing performance standards relating to SWS accuracy, availability, launch reliability, logistics effectiveness, and parts obsolescence and Commercial-Off-the-Shelf (COTS) management. Each subsystem has its own unique set of performance parameters that contribute to the overall SWS performance targets. In this respect, performance degradation in any of the subsystems could cause overall SWS performance problems.

The SWS program includes 29 general TES services as follows: Accuracy Evaluation and Maintenance Support; Analysis and Evaluations of Patrol Data; Computer Resources Support; Configuration Management Support; Contract Data Management Support; Follow-on Commander-in-Chief (CINC) Evaluation Test (FCET) and Demonstration and Shakedown Operations (DASO) Support; Fleet Documentation Support; Life Cycle Management Support; Logistics Support; Maintainability and Maintenance Support; Obsolescence Management Support; On/Off-Site Field Engineering Support; Performance Evaluation Support; Problem Identification, Investigation, and Solution; Program Management Support; Quality Assurance and Surveillance Support; Reliability Support; Repairs Support; Safety Program Support; Software Development and Maintenance Support; Strategic Programs Alteration (SPALT) Technical Assistance; Subsystem-unique equipment support; Strategic Weapons Facility Atlantic (SWFLANT) and Strategic Weapons Facility Pacific (SWFPAC) Support; Systems Evaluations and Design Technical Assistance; Support Planning Assistance; Test Equipment Support; Test Facility Operation and Maintenance; Trouble Failure Report (TFR) Analysis and Corrective Action Reports (CARs) Support; and Training Support. Detailed differences between the levels and types of support for each TES service task exist between Contractors and subsystems. The breadth of engineering disciplines involved in supporting these efforts include design, systems, software, electrical, manufacturing, mechanical, industrial, materials, component, test, field, quality, and logistics engineers.

7. SSP Has Implemented Overarching Incentive Structures on TES Services Contracts Under Cost Plus Incentive Fee (CPIF) Level-of-Effort (LOE), FPI Completion, and CPIF Completion Contracting Instruments

An overarching performance incentive can be defined as an incentive that is associated with key hardware performance parameters but is applied against TES services. The general philosophy behind the overarching performance incentive approach is that the existing levels of performance associated with the TRIDENT missile and its delivery systems can't be sustained without excellent TES services delivery. Each transitioned SWS TES services effort had originally been performed under Cost Plus Fixed Fee (CPFF) LOE contract types with intensive focus on technical performance rather than cost control. Implementing performance-based language has been challenging since the Government is justifiably concerned about process control on a nuclear program where it is rightly held accountable for safety. In reality much of the current contract language remains tightly specified by the Government.

Overarching system level performance incentives have been applied to CPIF LOE SWS subsystems TES service related CLINs since the late 1980s starting with the missile subsystem contract and more recently with the navigation and fire control subsystems contracts. The conversion from a CPFF LOE to CPIF LOE contract structure did not materially affect the negotiation and contract development processes. Results of this contracting approach have been successful for the Government resulting in retention of a skilled labor force despite the industry-wide boom and bust of the 1990s and early 2000s, adequate cost growth notification and control, little additional administrative effort, and excellent sustained system level performance. The contracting approach has also been successful for the Contractors since their rate of return on investment for low cost and performance risk effort has increased substantially and a stable minimum volume of long-term work has been virtually assured. Further, the quality of the delivered service did not create a programmatic or administrative problem for the parties since the deliverable (hours) did not change when converted from a CPFF LOE to CPIF LOE contract type.

The FY 99 SWS navigation subsystem TES services effort was contracted for under a FPI contract type with overarching performance incentives. Although the parties were able to agree on the contracting approach and implementing language during the negotiation process the actual performance results were unsuccessful due to interpretive problems on both sides of the business relationship. The TES services effort overran by approximately five percent resulting in extraordinary upper-level management attention by both parties due to increased program friction, significantly increased program and administrative involvement by the Contracting Officer, and the virtual impossibility of determining whether a deliverable met the intended quality standard. The experienced contract and performance management problems resulted in reassessment of the contracting approach, eventually resulting in the implementation of a CPIF LOE contracting philosophy with overarching performance incentives beginning in FY 00 and for all subsequent SWS navigation subsystem effort.

The FY 01 SWS launcher subsystem TES services were contracted for under a CPIF completion contract type with overarching performance incentives. The contract language development approach differed substantially from that used in the FPI effort and provided significantly more flexibility. The actual performance results of this flexible approach were more successful than the FPI approach as the Government was provided more cost and performance control and the Contractor was provided a higher return on their investment and improved programmatic response. However, weaknesses still existed in determining whether a deliverable met the intended quality standard. The CPIF completion approach with overarching performance incentives has become the accepted contracting approach for the SWS launcher subsystem TES services effort.

8. Targeted Performance Incentives on the SWS Program Have Been Sporadic and Relatively Recent With Experienced Implementation Challenges Despite Existing Long-term Business Relationships

A targeted performance incentive can be defined as an incentive that is associated with a particular TES services element. The general philosophy behind the targeted performance incentive approach is to incentivize specific important TES service elements

that directly affect the overall system performance. A TES service element can be designated important as a result of experienced performance problems or because of the magnitude of its contribution to system level performance. The Government has had problems relinquishing process control and the Contractor has been reluctant to accept the additional performance risk and process management responsibility. In most cases the additional incentive pool amounts assigned the targeted area provide little motivation for the increased Contractor responsibility. Increased monitoring requirements and uncertainty in achieved performance improvement lead to concerns as to whether the benefits attained are worth the administrative costs of attaining them. The SWS launcher subsystem participants attempted to convert the entire FY 03 deployed systems support effort (\$31M of planned budget), including TES services and other efforts, to a performance-based targeted incentive service contract. The implementation process generally followed the PBSA implementation presented in Chapter II, Section C of this thesis. After a complete analysis had been performed and significant administrative costs had been incurred the parties agreed to attempt a PBSA conversion of logistics provisioning only (\$800K of the originally planned \$31M budget) with only part of the effort finally converted. Performance results of the converted PBSA effort have not been fully assessed. Preliminary indications are that the Government is moderately uncomfortable about the change in process control while the Contractor claims that the only efficiency savings that have occurred are those associated with the reduction of Government oversight. The disappointing results were that significant resources and administrative costs were incurred, less than two percent of the target effort was converted, participants were frustrated and would likely not volunteer for future attempts, and both Government and Contractor management ultimately balked at accepting any perceived additional risk.

9. The Complete Conversion of SWS TES Services to PBSA Is Neither Practicable Nor Desirable

The SWS program experiences with PBSA on TES services have been evolutionary but limited. Although SSP has attempted to convert some SWS TES

services to PBSA, the SWS program will generally still need to be prescriptive and to exert strong oversight because of safety, cost, and/or technical risks. SSP's PBSA experience is consistent with findings from a recent GAO PBSA review concluding that guidance and limitations are needed in implementing performance-based service contracting [Ref. 43]. Nevertheless the SWS program appears to be ahead of the PBSA learning curve when compared with other MDAPs at a minimum and possibly even with less complex efforts. Fundamental considerations in future PBSA conversion attempts at SSP concern the effort's relevancy and benefits. A primary question is how does the conversion of all or parts of SWS TES services to PBSA benefit the Navy and SSP? Based on SSP's PBSA conversion experience a clear benefit does not exist since it did not increase competition, encourage non-traditional Contractors to participate, save time, and result in cost savings. In addition, since high performance standards were designed into the SWS it is uncertain as to whether incentivizing sustained performance is meaningful. A question that should be asked is whether the application of an overarching or targeted incentive would actually impact performance given existing SWS performance standards. If it wouldn't then the Government should not offer the Contractor easily attainable additional profit. Conversely is it reasonable to force long-term business partners to accept increased performance risk without providing additional profit opportunities?

C. RECOMMENDATIONS

1. The DoD and DON Should Identify the Core Program and Business Conditions That Must Exist for PBSA to Be Effective

Historical PBSA policy promulgation and guidance documents have been effective in providing a broad PBSA definition, communicating PBSA implementation procedures, and demonstrating that the DoD and DON are serious about applying PBSA to the maximum extent practicable. This "transformation" approach was required since service acquisition has become a major component of DoD and DON acquisition and has been historically mismanaged. However, existing policy presumes that all services

acquisition can eventually be transitioned into a PBSA environment and that significant performance improvements and cost reductions will occur if Contractors are given the responsibility and flexibility to manage program processes. Although the DON Implementation plan requires PBSA only on selected service contract categories it does not provide guidance on what core program and business conditions must exist for PBSA to be effective.

The findings of this thesis and various GAO reports support that PBSA is not effective for all services. There is no doubt that PBSA can be effective in a commercially provided service arena, such as computer help desk operations, where significant competition exists and Contractors within the industry are motivated to either technically or programmatically outperform competitors. However, the chances for successful PBSA implementation decrease as competition in a service sector decreases. Similarly, the chances for successful PBSA implementation is impacted by the technical and performance risk of a program. Contractors are generally willing to take performance or programmatic risks while providing noncomplex or non-hazardous services. Such an environment can provide increased efficiency and corresponding cost savings. However, Contractors generally perform conservatively if the chances of performance failure are great due to the technical complexity of the operation or if excessive safety liabilities exist.

PBSA is perceived as a panacea by DoD and DON leadership as budgets decline, the need for weapons modernization increases, and intense pressure is placed on buying Commands to reduce MDAP development, production, and total ownership costs. Consequently, leadership within the buying Commands is aggressively directing the acquisition community to implement PBSA to the maximum extent practicable. In response the acquisition community is expending significant resources and has experienced major confusion and frustration over how to make PBSA work in any business environment and for complex and hazardous service efforts. Although major administrative costs have been expended, few complex services have been converted and even fewer have ever realized an increase in efficiency or cost savings. Providing a business case model that programs could use to effectively determine whether PBSA

conversion is meaningful and achievable for their specific services and business environment could (1) focus attention on those programs with a high probability of PBSA conversion success, (2) relieve the political and management pressure placed on the acquisition community to convert all services, (3) reduce the general implementation frustration level, and (4) reduce administrative costs in an era of workforce reduction.

2. PBSA Training Curriculums Should Include a Practical Module on Determining Whether PBSA Implementation Is Relevant for the Student's Command and Program

Training institutions have naturally reacted to the Government's clear commitment to PBSA and endorsement that proper training is a key ingredient to successful PBSA implementation. The number of PBSA training programs has increased and the quality of the available training has improved as successful field implementation has evolved. Initial PBSA training was more focused on definition and model development while current PBSA training is more focused on successful implementation. Some if not all programs offer facilitators to Commands desiring external assistance. From a pure business perspective facilitation offers the training institution increased access to PBSA related activity and associated budget. Accordingly, PBSA training providers could become increasingly incentivized to instruct students that PBSA is meaningful and achievable on all services in an effort to maximize revenue.

Requiring PBSA training providers to provide a module on determining whether PBSA is meaningful and achievable for each student's program and business environment could avert this natural business progression. Students would be required to bring a representative statement of work from their service contracts and overall Command business characteristics (i.e. what percentage of the Command's service business is competed, average related contract dollar amount, etc.) to class in order to perform a task and business analysis of their specific programs during earlier training modules. The resulting output would then be used as input to the "determination" module. Results of the analysis could ultimately serve as a go/no-go decision for PBSA conversion attempts at the student's Command. The required module would limit

fruitless PBSA conversion attempts and could stimulate innovation within the PBSA training community.

3. DON Reporting Metrics Should Be Revised to More Accurately Capture PBSA Conversion Performance

DON's implementation plan requires HCAs to provide PBSA metrics to assess DON effectiveness in implementing PBSA. HCAs must provide the total service contract awards, PBSA contract awards, and PBSA compliance rate by total estimated dollars and total number of actions for each specific business area. The existing PBSA metrics structure unnecessarily increases Command administrative time in metric collection and reporting and drives Commands to attempt PBSA conversion on all service contracts in order to improve its "compliance" rate. Buying Commands should provide ASN with an assessment of program service contracts that should and should not be converted to PBSA. Justification and approval should be required for those services where PBSA should not apply and the Command would be relieved from the obligation of reporting on those excluded services. The Command would additionally be required to submit revised justification if a material element of its initial justification on an excluded service changed (i.e. a sole-source effort was converted to competitive).

Additionally, ASN should allow Commands to report on all PBSA conversion activity rather than just those contracts that have at least 80% of its dollar value meeting the criteria of FAR 37.6. The current restriction eliminates some PBSA conversion accomplishment from being reported, as is the case on a large omnibus contract with substantial production effort, leading to an inaccurate performance measure. Finally, ASN should accept the HCA metric data, not the DD 350, as the definitive database resource for upward reporting of DON PBSA conversion performance to eliminate confusion created by conflicting database information. The resulting effectiveness and efficiency of PBSA metric reporting and associated focus on those services where PBSA should be applied would outweigh the upfront administrative costs associated with baselining PBSA conversion activity.

4. SSP Should Develop a Program-wide, Multi-functional, Government-only PBSA Team to Review Existing TES Services Statements of Work to Determine Potential PBSA Conversion Tasking

Review of historical SSP PBSA conversion attempts has indicated differences in the composition of PBSA teams and implementation approaches between individual SWS subsystem branches. The spectrum of PBSA team composition ranged from a single individual directing conversion activity to a project engineer developing a predominantly engineering staffed team with intermittent supporting advisory staff. There were no instances of a PBSA team comprised of a permanent multi-functional membership and no team was provided the broad discretion or authority to execute the conversion. Similarly, the spectrum of implementation approaches ranged from the simple reallocation of hardware performance incentives to engineering services effort to detailed task review and targeted incentive development and application. The factual record suggests that individual SWS subsystem branch leadership and organizational dynamics determine whether PBSA conversion is attempted and, if so, to what extent; branches differ in their understanding of what PBSA is and how it should be implemented; and intra-branch communication of PBSA conversion successes and failures is ineffective.

The existing environment is neither effective nor efficient in determining whether PBSA can work on SWS TES services. A more practical approach would be to establish a program-wide, multi-functional, Government-only PBSA team to review existing TES services statements of work to determine potential PBSA conversion tasking. The team would be comprised of senior-level front-line personnel including a project engineer from each SWS subsystem branch, an SWS system integration engineer, a logistics engineer, a contracting officer, a comptroller representative, and a lawyer; a senior management representative; and a fleet representative. The team size should not exceed 12 members and membership should be diversified to include a mixture of civilian, military, headquarter, and field support representation. The team should be provided decision-making discretion and authority; develop a working charter; meet during regular duty hours at fixed intervals until the project is complete; and be materially rewarded based on a combination of the number of discrete tasks identified for conversion and implementing

methodologies developed. This approach could be effective because (1) individual branch leadership and dynamics would not influence the decision-making process, (2) a core set of common TES services exists, (3) each individual branch contributes to system level performance, (4) historical branch-unique PBSA experience could be shared and leveraged upon, (5) differences in individual branch and associated Contractor program environment and business relationships could be evaluated, (6) a common team goal and set of objectives could be established and acted upon, and (7) the team would be properly incentivized to perform.

5. SSP Should Team With Its Business Partners to Develop a Business Case That Determines Whether or Not PBSA Conversion of Individual TES Services Tasks Will Result in Operational Efficiencies and Program Cost Savings

The SWS program was founded and has been executed upon the concept of sole-source, long-term business relationships with a family of contractors including, at its core, DoD giants such as Lockheed Martin, Northrop Grumman, Boeing, and General Dynamics. These relationships have fostered an environment of Government/Industry teamwork; shared technical, program, and cost risk; and a higher than average profit margin for participating Contractors due to the inclusion of performance and schedule incentives into SWS subsystem contracts. The overarching contracting strategy is founded on the premise that deployed systems have been fielded at high performance levels, the SWS fleet is highly trained and conditioned to rely on those performance levels, and historical CPFF LOE TES services contracts provide a flexible contract mechanism for the fleet, program management, and Contractors. Under this philosophy SWS Contractors have been able to leverage their production contracts, where the profit margin is relatively high, off of the TES services contracts, which have historically provided a large reserve of funding to trouble-shoot and correct fleet problems, to virtually assure a high rate of return on its investment. In this environment of declining budget the SWS Contractors are focused on maintaining their labor force and are reluctant to accept additional performance risk.

After the PBSA team has thoroughly evaluated TES service statements of work to define PBSA convertible tasks a business case will need to be developed to determine those tasks that could potentially result in operational efficiencies and/or program savings if converted. SSP can benefit from inviting SWS Contractors to comment and contribute in the development of a thorough business analysis given the program culture. SWS Contractors possess intimate detailed knowledge of the processes required to most effectively and efficiently perform TES services. This key knowledge, as well as insight as to how Contractors internally measure an individual engineer's performance, could significantly contribute to the development of a realistic business model. Additionally, the Contractors should be more supportive of PBSA conversion attempts if they have been provided an opportunity to influence which tasks are selected.

6. Selected SWS PBSA TES Services Should Be Contracted for Under a CPIF Completion Contracting Approach With an Aggressive Share Line and Targeted Performance Incentives Attached to Specific Process Related Problem Areas

After specific TES service tasks have been officially selected for PBSA conversion each SWS branch and Contractor will need to work together to establish a PBSA contract through the use of the PBSA model established in Chapter II, Section C of this thesis. In summary each SWS branch and Contractor will need to establish a PBSA team to manage and administer the effort during the entire performance period, develop a contracting approach to isolate TES services PBSA activity in its omnibus contract, develop and provide effective surveillance and inspection and acceptance processes, resolve arising problems and conflict, and collect meaningful performance metrics. Although recommendation number five above should achieve Contractor buy-in to the TES services PBSA conversion effort additional incentive may be required to motivate performance success.

PBSA implementation experience to date has established that SWS Contractors have historically had little incentive to agree to changes in the current program and contracting arrangements. The current philosophy of allocating overarching hardware performance incentives to CPIF LOE TES services with steep share lines (i.e. 90/10 and

80/20) does not promote operational efficiencies and cost control. Contractors are motivated to retain staff and can easily attain hardware performance levels. The use of a CPIF completion contracting approach with an aggressive share line (no higher than a 50% Government share) and targeted performance incentives attached to specific process related problem areas would best suit the program and business issues associated with selected SWS PBSA TES services. This CPIF completion contract type would shift performance and cost risk more clearly to the Contractor but still provides the Contractor with more protection than a fixed price approach. The aggressive share line will incentivize the Contractor to consider the cost of process improvements. The targeted performance incentives would motivate the Contractor to concentrate on solving process related issues. In summary a completion requirement with a balanced, multiple incentive approach would (1) emphasize task delivery, (2) allow the Contractor to make cost/performance trade-offs that are in the interest of both parties, and (3) may enhance the chances for successful TES service PBSA implementation and performance.

D. ANSWERS TO RESEARCH QUESTIONS

1. Primary Research Question

- a. Should the Strategic Systems Programs (SSP) Apply the Concepts of PBSA to Strategic Weapons Systems (SWS) Technical Engineering Support (TES) Services?*

SSP should apply the concepts of PBSA to selected SWS TES services. SSP should undergo an organized and comprehensive review of TES services tasking by SWS subsystem and at the system level using available PBSA procedures and methodologies. Candidate tasks should be selected only if the PBSA conversion would result in acceptable programmatic and technical risk, operational efficiency, and projected cost savings. The following answers to the secondary questions of this thesis will provide supporting rationale for the primary research question answer.

2. Secondary Research Questions

a. What Is PBSA and What Are the Overarching Department of Defense (DoD) and Department of Navy (DON) PBSA Policy Objectives?

Performance-based contracting is the structuring of all aspects of an acquisition around the purpose of the work to be performed as opposed to either the manner by which the work is to be performed or broad and imprecise statements of Work. FAR Subpart 37.6 sets forth that performance-based contracts should (1) describe the requirements in terms of results required rather than the methods of performance of the work, (2) use measurable performance standards (i.e., terms of quality, timeliness, quantity, etc.) and quality assurance surveillance plans (see 46.103(a) and 46.401(a)), (3) Specify procedures for reductions of fee or for reductions to the price of a fixed-price contract when services are not performed or do not meet contract requirements (see 46.407), and (4) include performance incentives where appropriate. This thesis details a PBSA model composed of five key activities including establishment of a multifunctional team, market research, requirements generation, source selection, and contract performance. Establishment of a multifunctional team is an essential first step for successfully executing a PBSA and discussion revolved around team membership and management. The market research and source selection activities are generally consistent with other type of federal acquisitions and discussion leveraged upon existing federal regulation. Discussion of the requirements generation activity presented two alternative approaches including the PWS and SOO and provided insight as to the importance of establishing a QAP. A PWS generally includes the development of a job analysis, performance objectives, performance standards, acceptable quality levels, and a performance requirements summary. The SOO is a much different requirements approach in that the Government provides the Contractor with a set of high-level performance objectives and allows the Contractor to propose a detailed performance plan. Key elements of the contract performance activity include service delivery, surveillance, contract administration, conflict resolution, and performance measurement.

Evolutionary PBSA policy foundation and implementation guidance, beginning with OFPP P.L. 91-2 dated 9 April 1991, supports that the Government is becoming increasingly focused on improving the efficiency of service acquisitions through the use of PBSA. The existing overarching DoD policy is that, at a minimum, 50 percent of service acquisitions, measured both in dollars and actions, are to be performance-based by the year 2005. DoD implementing guidance is provided in the “Guidebook for Performance-Based Services Acquisition (PBSA) in the Department of Defense (DOD)” issued by the Undersecretary of Defense for Acquisition, Logistics and Technology in December 2000. DON’s policy is provided in the “DON Performance Based Service Acquisition Implementation Plan” dated June 2000. ASN(RD&A) has been established as the focal point for implementing DON PBSA guidance and criteria to all functional areas of the DON acquisition community. The DON implementation plan stipulates that (1) a DON contract can be categorized as PBSA if at least 80% of its dollar value met the criteria of FAR 37.6 to be categorized as PBSA, (2) standard commercial services may be considered PBSA, and (3) the plan applies to service requirements exceeding the DD 350 reporting threshold of \$25,000. The implementation plan identifies the service contract categories to which PBSA applies maintenance, overhaul, repair, service, rehabilitation, salvage, modernization or modification of supplies, systems or equipment; maintenance of real property; base operations and support contracts; operation of Government-owned equipment, facilities and systems; education and training; medical services; program management support; and Research and Development (less basic and applied research). HCAs must provide PBSA metrics including the total service contract awards, total PBSA contract awards, and PBSA compliance rate by estimated dollars and numbers of actions in order to assess DON PBSA implementation effectiveness.

b. What Are Major Defense Acquisition Program (MDAP) TES Services?

DoD acquisition programs are categorized by ACAT designation including ACATs I (various), II, III, and IV. The ACAT designation of a program determines the level of oversight for key milestones within the program's development, production, testing and deployment. Major systems receive ACATs I (various) and II designations. ACAT I programs are further defined as MDAPs, designated as ID or IC, or MAISAPs, designated as IAM or IAC. MDAPs are designated by the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)). A program is considered an MDAP if its projected development effort exceeds \$365 million or its projected procurement effort exceeds \$2.19 billion in FY 2000 constant dollars. There are currently 10 ACAT ID and 16 ACAT IC MDAPs within the DON. MDAPs are conceived, managed, reviewed, and approved through the Defense Acquisition Management Framework contained within the new DoD 5000.2 instruction approved on 12 May 2003. The Defense Acquisition Management Framework details an overarching program acquisition cycle that includes three milestone decision points (A, B, and C) and five distinct progression phases including CR, TD, SDD, PD, and OS with each distinct phase containing service acquisition efforts. This thesis focuses on specific engineering service effort within the OS phase relating to the operational sustainment and upgrade of deployed systems.

SSP's SWS program is an MDAP with the predominant portion of its TES services residing in the OS phase. The SWS program includes 29 general TES services as follows: Accuracy Evaluation and Maintenance Support; Analysis and Evaluations of Patrol Data; Computer Resources Support; Configuration Management Support; Contract Data Management Support; FCET and DASO Support; Fleet Documentation Support; Life Cycle Management Support; Logistics Support; Maintainability and Maintenance Support; Obsolescence Management Support; On/Off-Site Field Engineering Support; Performance Evaluation Support; Problem Identification, Investigation, and Solution; Program Management Support; Quality Assurance and Surveillance Support; Reliability Support; Repairs Support; Safety Program Support; Software Development and

Maintenance Support; SPALT Technical Assistance; Subsystem-unique equipment support; SWFLANT and SWFPAC Support; Systems Evaluations and Design Technical Assistance; Support Planning Assistance; Test Equipment Support; Test Facility Operation and Maintenance; TFR Analysis and CARs Support; and Training Support. Detailed differences between the levels and types of support for each TES service task exist between Contractors and subsystems. The breadth of engineering disciplines involved in supporting these efforts include design, systems, software, electrical, manufacturing, mechanical, industrial, materials, component, test, field, quality, and logistics engineers.

c. What Has Been SSP's Experience With TES Services PBSA Acquisition Strategies?

SSP has implemented overarching and targeted incentive structures on TES services contracts under CPIF LOE, FPI completion, and CPIF completion contracting instruments. An overarching performance incentive is an incentive that is associated with key hardware performance parameters but is applied against TES services. A targeted performance incentive is an incentive that is associated with a particular TES services element. Overarching system level performance incentives have been applied to CPIF LOE SWS subsystems TES service related Contract Line Item Numbers (CLINs) since the late 1980s starting with the missile subsystem contract and more recently with the navigation and fire control subsystems contracts. The conversion from a CPFF LOE to CPIF LOE contract structure did not materially affect the negotiation and contract development processes. The approach has been successful for both the Government and Contractors as follows: (1) a skilled labor force has been retained despite the industry-wide boom and bust of the 1990s and early 2000s, (2) adequate cost growth notification and control has been maintained; (3) little additional administrative effort has occurred; (4) excellent sustained system level performance has been maintained; (5) Contractors have received a high rate of return on investment for low risk effort, (6) a stable minimum volume of long-term work has been virtually assured; and (7) the quality of the delivered service remained unchanged.

The FY 99 SWS navigation subsystem TES services effort was contracted for under a FPI contract type with overarching performance incentives. Although the parties were able to agree on the contracting approach and implementing language during the negotiation process the actual performance results were unsuccessful due to interpretive problems on both sides of the business relationship. The TES services effort overran by approximately five percent resulting in extraordinary upper-level management attention by both parties due to increased program friction, significantly increased program and administrative involvement by the Contracting Officer, and the virtual impossibility of determining whether a deliverable met the intended quality standard. The experienced contract and performance management problems resulted in reassessment of the contracting approach, eventually resulting in the implementation of a CPIF LOE contracting philosophy with overarching performance incentives beginning in FY 00 and for all subsequent SWS navigation subsystem effort.

The FY 01 SWS launcher subsystem TES services were contracted for under a CPIF completion contract type with overarching performance incentives. The contract language development approach differed substantially from that used in the FPI effort and provided significantly more flexibility. The actual performance results of this flexible approach were more successful than the FPI approach as the Government was provided more cost and performance control and the Contractor was provided a higher return on their investment and improved programmatic response. However, weaknesses still existed in determining whether a deliverable met the intended quality standard. The CPIF completion approach with overarching performance incentives has become the accepted contracting approach for the SWS launcher subsystem TES services effort.

The SWS launcher subsystem participants attempted to convert the entire FY 03 deployed systems support effort (\$31M of planned budget), including TES services and other efforts, to a performance-based targeted incentive service contract. The implementation process generally followed the PBSA implementation presented in Chapter II, Section C of this thesis. After a complete analysis had been performed and significant administrative costs had been incurred the parties agreed to attempt a PBSA conversion of logistics provisioning only (\$800K of the originally planned \$31M budget)

with only part of the effort finally converted. Performance results of the converted PBSA effort have not been fully assessed. Preliminary indications are that the Government is moderately uncomfortable about the change in process control while the Contractor claims that the only efficiency savings that have occurred are those associated with the reduction of Government oversight. The disappointing results were that significant resources and administrative costs were incurred, less than two percent of the target effort was converted, participants were frustrated and would likely not volunteer for future attempts, and both Government and Contractor management ultimately balked at accepting any perceived additional risk.

d. What Are the Significant Factors That Have Facilitated or Hindered SWS TES Services PBSA Implementation?

The SWS program was founded and has been executed upon the concept of sole-source, long-term business relationships with a family of contractors including, at its core, DoD giants such as Lockheed Martin, Northrop Grumman, Boeing, and General Dynamics. These relationships have fostered an environment of Government/Industry teamwork; shared technical, program, and cost risk; and a higher than average profit margin for participating Contractors due to the inclusion of performance and schedule incentives into SWS subsystem contracts. The overarching contracting strategy is founded on the premise that deployed systems have been fielded at high performance levels, the SWS fleet is highly trained and conditioned to rely on those performance levels, and historical CPFF LOE TES services contracts provide a flexible contract mechanism for the fleet, program management, and Contractors. Under this philosophy SWS Contractors have been able to leverage their production contracts, where the profit margin is relatively high, off of the TES services contracts, which have historically provided a large reserve of funding to trouble-shoot and correct fleet problems, to virtually assure a high rate of return on its investment. PBSA negatively affects this program relationship in that the SWS Contractors perceive a fundamental program shift away from partnership and shared risk and SSP perceives a loss of program control.

The current philosophy of allocating overarching hardware performance incentives to CPIF LOE TES services with steep share lines (i.e. 90/10 and 80/20) does not promote operational efficiencies and cost control. PBSA implementation experience to date has established that SWS subsystem branches and their Contractors have historically had little incentive to agree to changes in the current program and contracting arrangements. SSP SWS subsystem branches are happy with Contractor performance and have little motivation to incur the potentially increased performance risk resulting from further staff reductions and shift of process control. SWS Contractors are focused on maintaining their labor force, can easily attain hardware performance levels, and are reluctant to accept additional performance risk.

Review of historical SSP PBSA conversion attempts has indicated differences in the composition of PBSA teams and implementation approaches between individual SWS subsystem branches. The spectrum of PBSA team composition ranged from a single individual directing conversion activity to a project engineer developing a predominantly engineering staffed team with intermittent supporting advisory staff. There were no instances of a PBSA team comprised of a permanent multi-functional membership and no team was provided the broad discretion or authority to execute the conversion. Similarly, the spectrum of implementation approaches ranged from the simple reallocation of hardware performance incentives to engineering services effort to detailed task review and targeted incentive development and application. The factual record suggests that individual SWS subsystem branch leadership and organizational dynamics determine whether PBSA conversion is attempted and, if so, to what extent; branches differ in their understanding of what PBSA is and how it should be implemented; and intra-branch communication of PBSA conversion successes and failures is ineffective. The existing environment is neither effective nor efficient in determining whether PBSA can work on SWS TES services.

e. How Might SSP Apply PBSA Best Practices and Risk Mitigation Strategies During the Acquisition of SWS TES Services?

SSP should develop a program-wide, multi-functional, Government-only PBSA team to review existing TES services statements of work to determine potential PBSA conversion tasking. The team would be comprised of senior-level front-line personnel including a project engineer from each SWS subsystem branch, an SWS system integration engineer, a logistics engineer, a contracting officer, a budget analyst, an accountant, and a lawyer; a senior management representative; and a fleet representative. The team size should not exceed 12 members and should be diversified to include a mixture of civilian, military, headquarter, and field support representation. The team would be provided decision-making discretion and authority; develop a working charter; meet during regular duty hours at fixed intervals until the project is complete; and be materially rewarded based on a combination of the number of discrete tasks identified and conversion methodologies developed. This approach would be effective for the following reasons: (1) individual branch leadership and dynamics would not influence the decision-making process, (2) a core set of common TES services exists, (3) each individual branch contributes to system level performance, (4) historical branch-unique PBSA experience could be shared and leveraged upon, (5) differences in individual branch and associated Contractor program environment and business relationships could be evaluated, (6) a common team goal and set of objectives could be established and acted upon, and (7) the team would be properly incentivized to perform.

SSP should team with its business partners to develop a business case that determines whether or not PBSA conversion of individual TES services tasks will result in operational efficiencies and program cost savings. SSP can benefit from inviting SWS Contractors to comment and contribute in the development of a thorough business analysis given the program culture. SWS Contractors possess intimate detailed knowledge of the processes required to most effectively and efficiently perform TES services. This key knowledge, as well as insight as to how Contractors internally measure an individual engineer's performance, could significantly contribute to the development of a realistic business model. Additionally, the Contractors should be more

supportive of PBSA conversion attempts if they have been provided an opportunity to influence which tasks are selected.

Selected SWS PBSA TES services should be contracted for under a CPIF completion contracting approach with an aggressive share line and targeted performance incentives attached to specific process related problem areas. After specific TES service tasks have been officially selected for PBSA conversion each SWS branch and Contractor will need to work together to establish a PBSA contract through the use of the PBSA model established in Chapter II, Section C of this thesis. In summary each SWS branch and Contractor will need to establish a PBSA team to manage and administer the effort during the entire performance period, develop a contracting approach to isolate TES services PBSA activity in its omnibus contract, develop and provide effective surveillance and inspection and acceptance processes, resolve arising problems and conflict, and collect meaningful performance metrics. The use of a CPIF completion contracting approach with an aggressive share line (no higher than a 50% Government share) and targeted performance incentives attached to specific process related problem areas would best suit the program and business issues associated with selected SWS PBSA TES services. This CPIF completion contract type would shift performance and cost risk more clearly to the Contractor but still provides the Contractor with more protection than a fixed price approach. The aggressive share line will incentivize the Contractor to consider the cost of process improvements. The targeted performance incentives would motivate the Contractor to concentrate on solving process related issues. In summary a completion requirement with a balanced, multiple incentive approach would (1) emphasize task delivery, (2) allow the Contractor to make cost/performance trade-offs that are in the interest of both parties, and (3) may enhance the chances for successful TES service PBSA implementation and performance.

E. SUGGESTED AREA FOR FUTURE RESEARCH

A core ingredient to successful PBSA implementation is the establishment of performance standards and associated AQLs and the ability to measure performance.

Such information is not readily available or intuitive for complex engineering services. The development of general industry-wide engineering performance standards may greatly enhance PBSA success. Follow-on research could focus on surveying Government activities and private sector firms to determine how engineering effort is measured, evaluated, and rewarded. The survey could be setup to evaluate differing experience levels, educational and training foundations, complexities of assigned tasks, corporate and/or program cultures, and engineering employee incentive structures.

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